SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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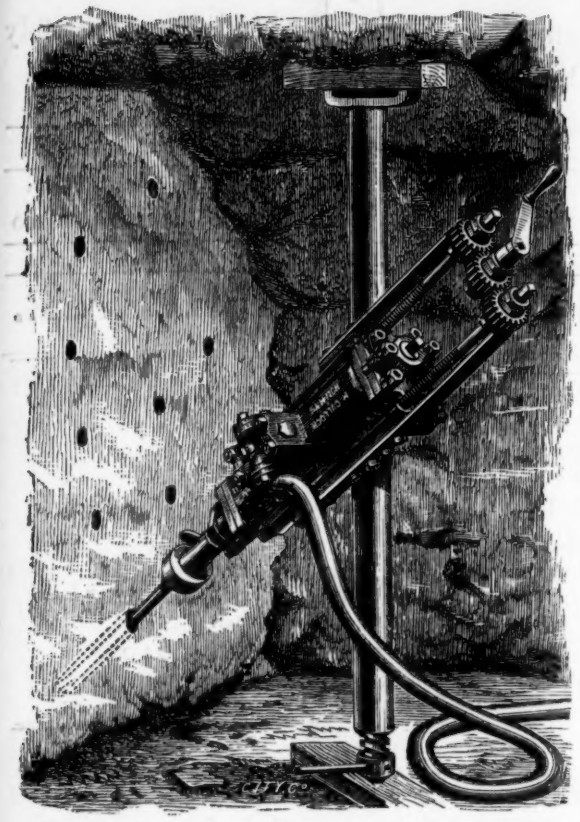
No. 2520.—VOL. LIII. LONDON, SATURDAY, DECEMBER 8, 1883. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC —Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air

JUBILEE EXHIBITION, 1882.

THE PATENT

"CORNISH" ROCK DRILL.



This Drill has been constructed after a long practical experience in the requirements necessary for Mines, and has more than realised the expectations of its inventors. The chief objects in view were GREATER DURABILITY AND LESS LIABILITY TO DISARRANGEMENT; but it has also proved itself more EFFECTIVE AND ECONOMICAL.

We are now prepared to enter into any reasonable arrangement so as to enable users to judge of its merits, as we are thoroughly convinced that we can offer the BEST ROCK DRILL IN THE MARKET.

Further particulars on application to the Makers—

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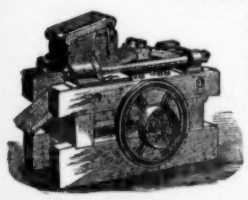
BLAKE'S LATEST IMPROVED PATENT

STONE CRUSHERS.



ALL STRAINS TAKEN BY WROUGHT IRON OR STEEL.
DOES TWICE THE WORK OF OLD FORM.
SECTIONAL AND EASILY SHIPPED.

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FOR LOCOMOTIVE OR MARINE BOILERS,
EITHER
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MEDALS AND HIGHEST AWARDS
SEVEN YEARS IN SUCCESSION
FOUR IN ONE YEAR.

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Royal Cornwall Polytechnic, 1877.
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AWARDED FOR
SIMPLICITY in CONSTRUCTION.
AUTOMATIC FEED
(Perfect success)
GREAT STEADINESS.
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GREAT DURABILITY.
GREAT EFFECTIVENESS.

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PERCUSSIVE ROCK PERFORATOR

(IMPROVED)
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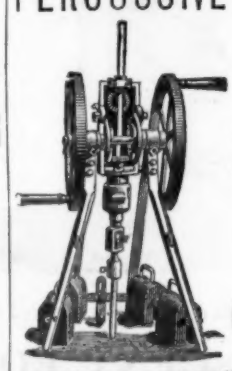

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RATE OF PENETRATION IN GRANITE,
1½ to 2 inches per minute.

Price £50 complete.

For full particulars, apply to

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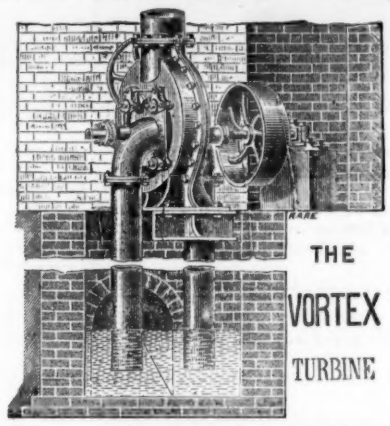

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A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

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CENTRIFUGAL PUMP

Is the only Pump from which the disc can be removed by breaking the joint on a single face only.

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IMPROVED CENTRE VENT.
TURBINES
WATER WHEELS,
Horse, Steam and Wind Power
PUMPS.

Catalogues on Application.

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THE PATENT

"ECLIPSE" ROCK-DRILL AND "RELIANCE AIR-COMPRESSOR."

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

SILVER MEDEL—PARIS, 1878—HIGHEST AWARD

Are NOW SUPPLIED to the ENGLISH, FOREIGN, and COLONIAL GOVERNMENTS, and are also IN USE in a number of the largest MINES, RAILWAYS, QUARRIES, and HARBOUR WORKS in GREAT BRITAIN and ABROAD.

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Feed-automatic, or by Hand, at will.
3-in. piston, 18-in. feed,
PHOSPHOR BRONZE CYLINDER & FITTINGS, £60,
SUITED TO LEVELS, SHAFTS, AND QUARRIES,
Adjustable mounting for either use, £30.

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Over 70 4-in. piston Machines employed at the above-mentioned Mines.
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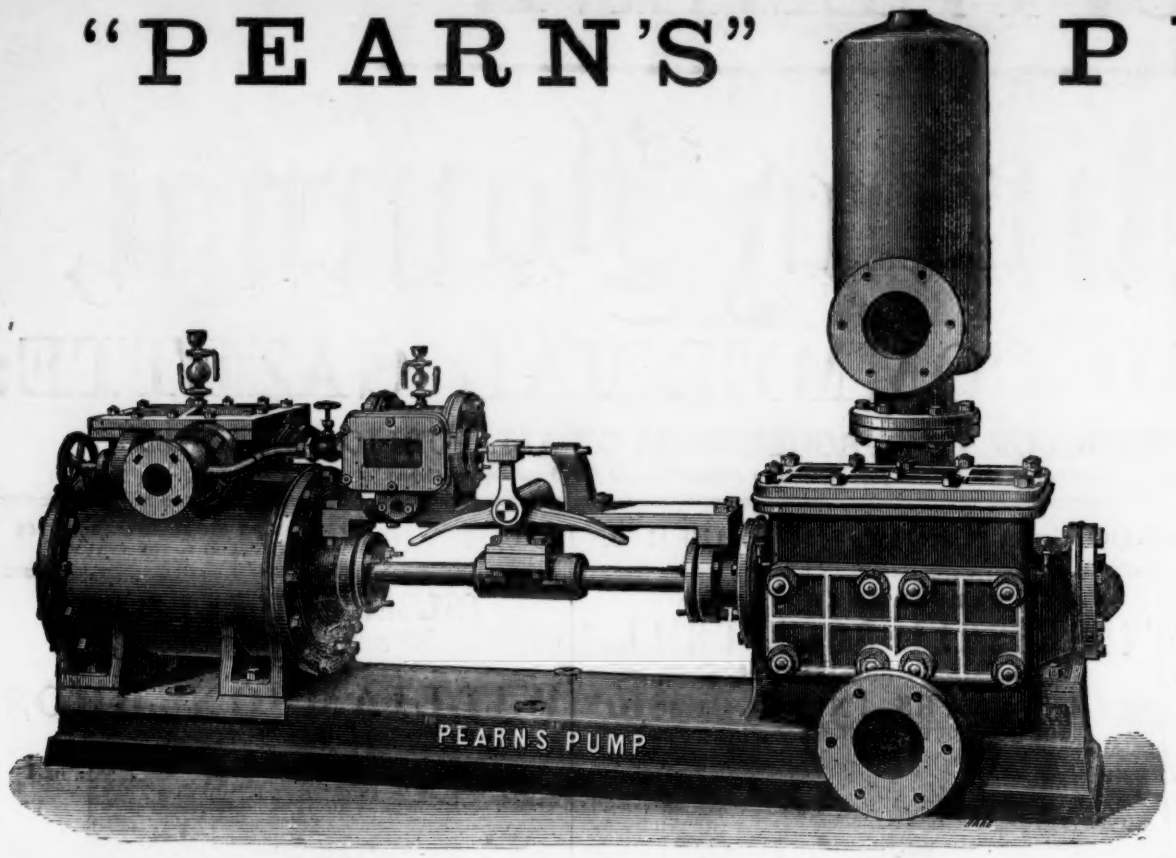

CUSHIONING.

PEARN'S combination of the SLIDE VALVE and PORTS in the AUXILIARY CYLINDER is the Simplest and most PERFECT CUSHION

SIMPLICITY AND DURABILITY.

IT HAS NO INTRICATE PARTS, the WORKING PARTS are the same as used in the ordinary STEAM ENGINE.

It is as Simple and as DURABLE as any Fly-wheel Pump, and cannot possibly become DERANGED.

Diameter of Water Cylinder..... In.	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	14
Diameter of Steam Cylinder.....	4 in.	5 in.	6 in.	6 in.	7 in.	7 in.	8 in.	10 in.	12 in.	12 in.	14 in.	14 in.	16 in.	18 in
Length of Stroke	9 in.	9 in.	9 in	9 in.	12 in.	12 in.	12 in.	12 in.	12 in.	18 in.	24 in.	24 in.	24 in.	24 in
Content, Gallons per Hour	950	1500	2160	2940	3840	4860	6000	8640	11590	15360	19440	24000.	34650	46360
Price..... £	18	2[illegible]	24	28	35	38	45	60	70	85	130	140	180	230

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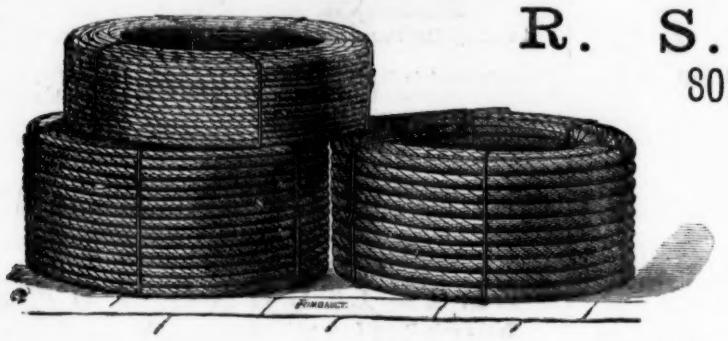

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Iron and Steel Ropes of the highest quality for Collieries, Railways Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

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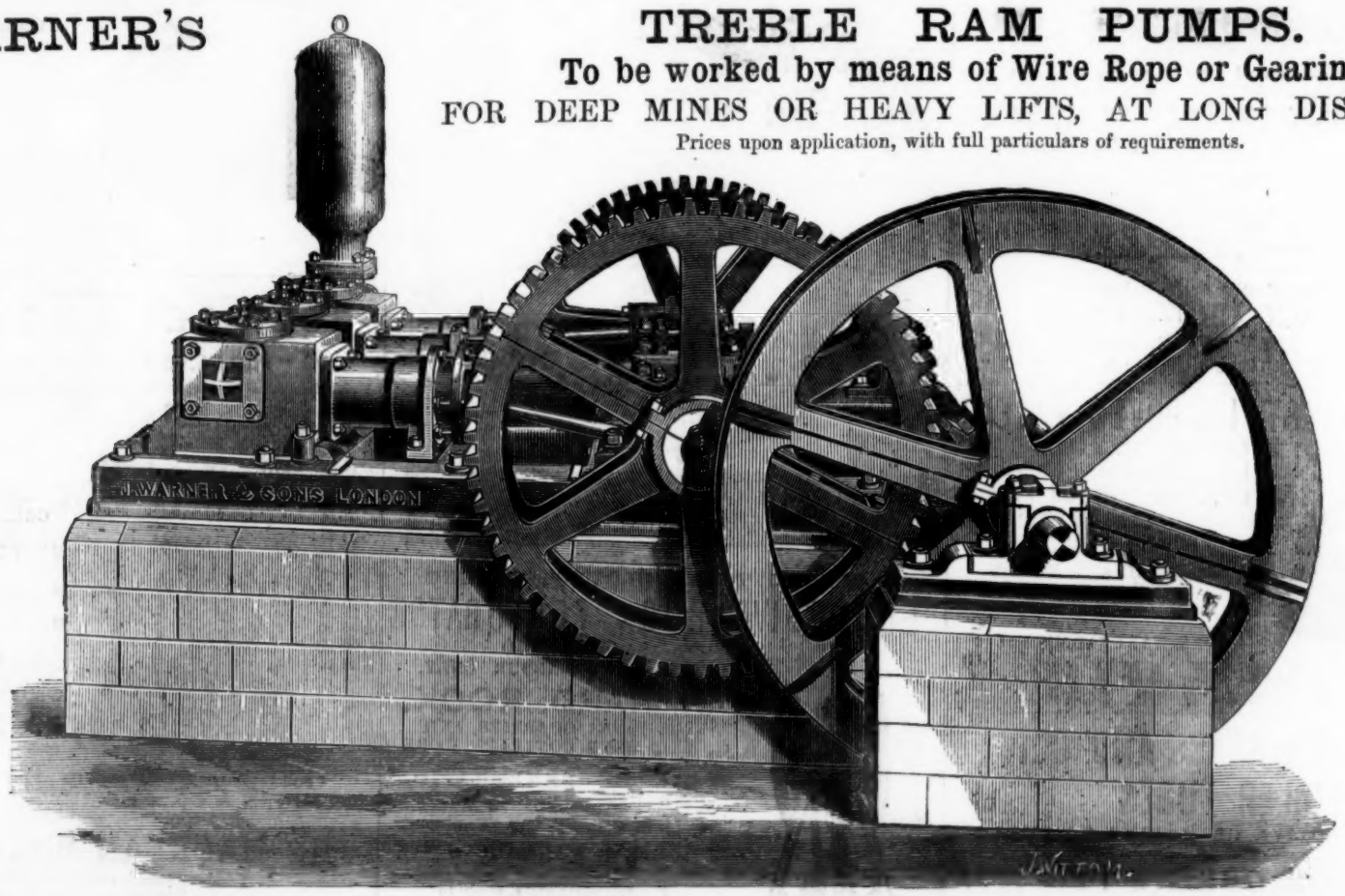
WARNER'S TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

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R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

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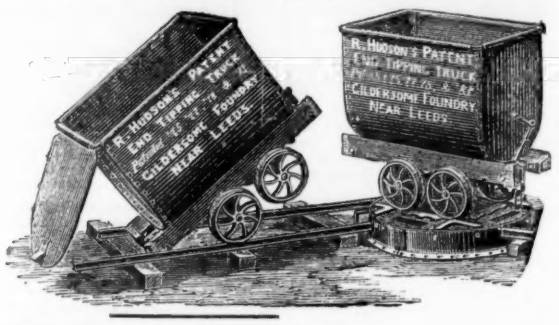
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

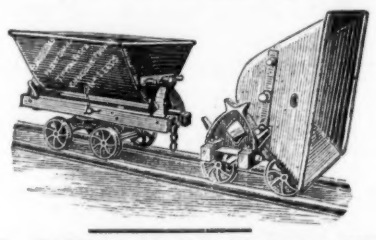
Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B:—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

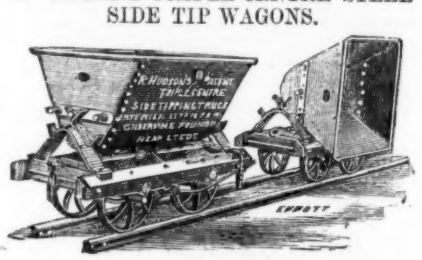
1.—PATENT STEEL END TIP WAGONS.



2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



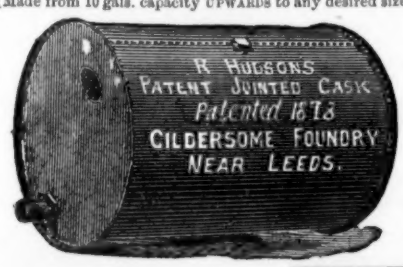
3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



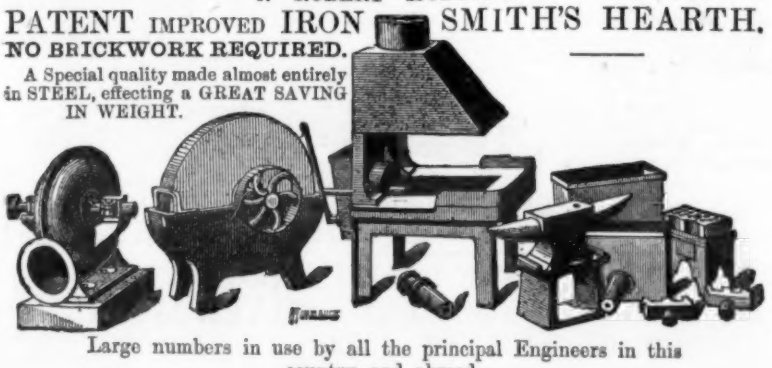
ONE man can EASILY tip ANY WEIGHT in these wagons.

4.—PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)

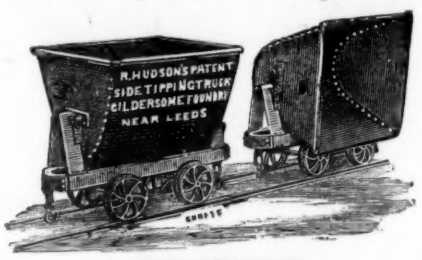


6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH.
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.

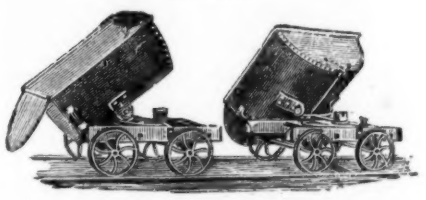


Large numbers in use by all the principal Engineers in this country and abroad.

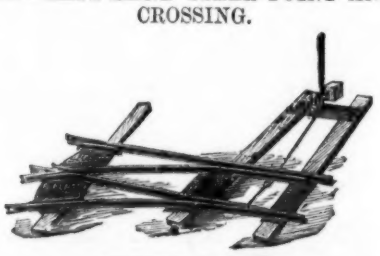
8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.



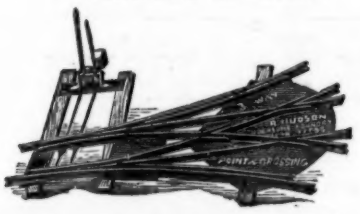
9.—PATENT STEEL ALL-ROUND TIP WAGON.



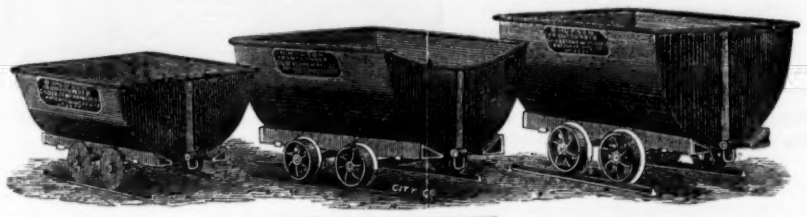
10.—LEFT-HAND STEEL POINT AND CROSSING.



11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



7.—PATENT STEEL MINING WAGONS.

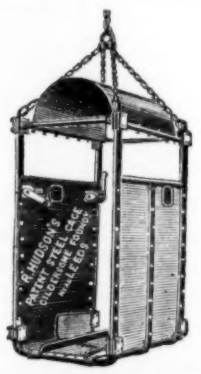


12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

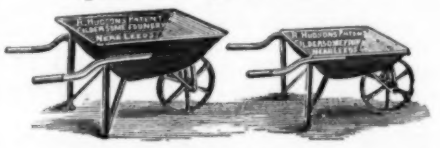
13.—PATENT STEEL HOPPER WAGON.

14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF ACTING if desired.)

15.—STEEL CAGE.

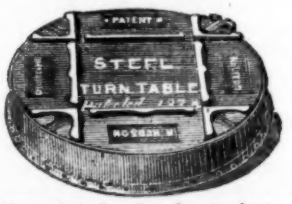


16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.



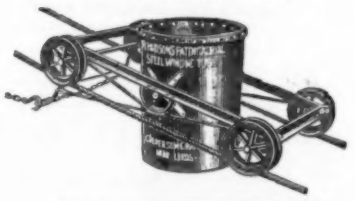
A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.



(Also made in CAST Iron for use where weight is not a consideration.

18.—"AERIAL" STEEL WINDING TUB.



Largely employed in the South African Diamond Fields.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrows

ALL KINDS OF BOLTS, NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING, for High Pressure Engines. This Packing has been specially designed to overcome the difficulties experienced by engineers and others in the practical working of engines of the most modern type of construction. The greatly increased skill and workmanship now obtained in the construction of engines and boilers have led to a rapid increase in the working pressure, the object being the attainment of a high rate of speed combined with economical working, the practical advantage of which, however, cannot be realised unless the Packings are so constructed as to avoid stoppages for the purpose of re-packing the stuffing boxes.

It is now a recognised fact that the most perfect heat-resisting material suitable for the purpose of a Packing is Asbestos, but to ensure a successful application of this fibre, great skill is required in its selection and manufacture. In this Packing the Asbestos is woven into a stout cloth, and owing to the peculiar way in which it is manipulated, great elasticity is imparted to the Packing. So successfully has this been done, that with light screwing, it has been found in practice that little or no lubricant is required to ensure a minimum amount of friction, and to keep the rods from over-heating. An improved vacuum is always maintained by the use of this packing, which meets with unqualified approval wherever it is applied.

The Patent Block Packing is square, as Fig. 1. and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid.

An Engineer writes as follows:—"The Asbestos Block Packing works splendidly. I have never seen its equal. We keep our gland nuts so that you can move them with finger and thumb, and can maintain a constant vacuum of 28½ in."

As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears my trade mark.

TRADE MARK.

To avoid spurious imitations, and to secure the receipt of genuine goods, all orders should be sent direct to the under-mentioned addresses, and not through Agents or Factors.

FIG.6. FIG.1. FIG.2. FIG.5. FIG.4. FIG.3.

BELL'S ASBESTOS BOILER & PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

1 ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonial refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon,
Nov. 28th, 1883.

Dear Sir,—
It may interest you to know that we save exactly 40 per cent. in fuel through using your covering.
Yours truly,
W. SANTO CRIMP, C.E., F.G.S.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It is the most efficient material for making bilge water pipe joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors; also for large "still" joints where boiling fat and steam have to be resisted. It is kept in stock in rolls of 100 ft., from ⅛ in. (Fig. 6) to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary.

The same material is made up into sheets about 40 in. square, and each sheet bears my Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives, and all Stationary Engines running at very high speed with intense friction.

The following Testimonial refers to this Packing:—

Festiniog Railway, Locomotive Superintendent's Office, Portmadoc,
January 13th, 1883.

Mr. John Bell, 113, Southwark-street, S.E.

Dear Sir,—I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed better than we expected. We have a locomotive packed with it, which has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting Packing. The Asbestos Yarn we find is very useful, and answers admirably.
Yours truly, (Signed) W. WILLIAMS.

Every 10 ft. length of Bell's Asbestos Yarn and Soapstone Packing bears a special label with the Trade Mark, and engineers are earnestly requested to see that this label is attached, to prevent imposition by worthless imitations.

Mr. John Bell, 113, Southwark Street, S.E.

Sewage Works, Winchester, Nov. 1st, 1883.

Dear Sir,—I have much pleasure in informing you that I have used your Asbestos and India-rubber Woven Sheeting and Tape with great satisfaction. Some of the Tape has been in use nearly 12 months on the pump cover joints, and situated as I am where there is no storage for the sewage, always obliged to keep one engine running, the facility and great saving of time in taking up a cover jointed with your Tape is a very important consideration.—Yours truly,
J. ASHCROFT, Chief Engineer.

It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with articles of less value at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears my Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and ½ millimetre to 25 millimetres thick. Each sheet bears my Trade Mark.

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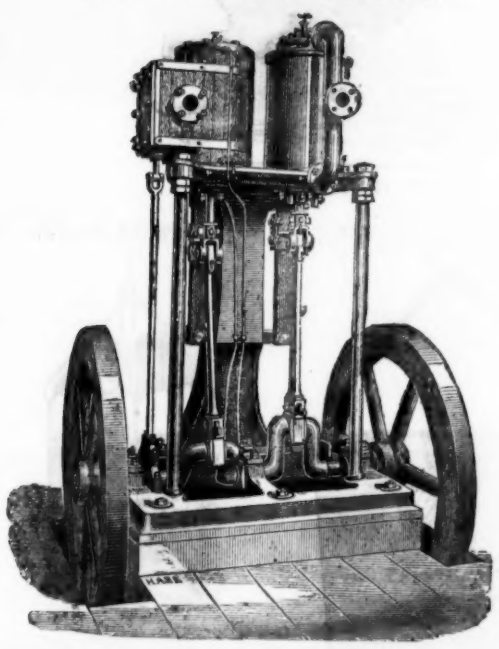
THE

"Champion" Rock-borer

AND AIR COMPRESSOR.



As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stoping done by contract by the Proprietor with his own Machinery now amounts to over 1150 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons in weight may be seen in constant work in the Camborne Mining District.

R. H. HARRIS,
ENGINEER,
63, QUEEN VICTORIA STREET, LONDON.

FROISETH'S NEW AND REVISED MAP FOR 1875,—Size 40 by 56 inches, scale 8 miles to the inch. Handsomely engraved, coloured in counties, showing the Towns, Settlements, Rivers, Lakes, Railroads Mining Districts, &c., throughout the Territory, and all the Government Surveys to date. Mounted on cloth, £2; half-mounted, £1 12s.; pocket form, £1.

Also, GENERAL MINING MAP OF UTAH, showing twenty-eight of the principal Mining Districts adjacent to Salt Lake City, and location of the most prominent mines. Price, pocket form, 6s.

Also, NEW MAP OF LITTLE AND BIG COTTONWOOD MINING DISTRICTS showing the location of over Four Hundred Mines and Tunnel Sites, together with the Mines Surveyed for United States Patent. Price, sheets, 6s.; pocket form, 8s.

For sale, and supplied by—
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E. A. M. Froiseth, Salt Lake City, Utah, U.S.

MONEY LENT, at EIGHT, NINE, and TEN PER CENT., on FIRST MORTGAGE of FREEHOLDS for IMPROVEMENTS and STOCKING, said freeholds in the Province of MANITOBA.
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MANUFACTURERS OF THE

CELEBRATED MINING STEEL, BRANDED

Cast Steel, Shear, Blister, Spring, Hammer, and Pick Steel.

Special Rock Drill Steel.

Mining Tools, Files, Saws, Hammers, and Picks.

CANNON STEEL WORKS, SHEFFIELD.

The Only Knapping Motion Stone Breaker and Ore Crusher.

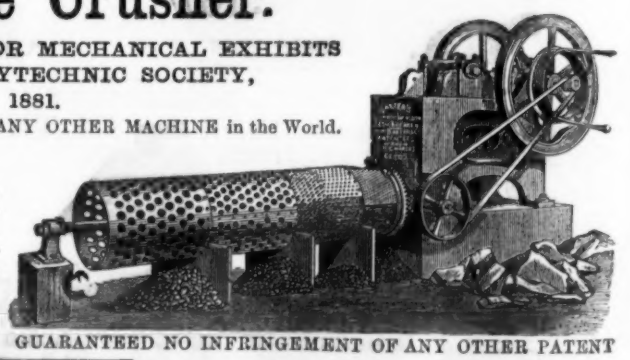
AWARDED THE ONLY SILVER MEDAL FOR MECHANICAL EXHIBITS AT THE ROYAL CORNWALL POLYTECHNIC SOCIETY, FALMOUTH, SEPT., 1881.

UARANTEED to do MORE WORK with less power THAN ANY OTHER MACHINE in the World.
NOTE THIS FACT.

To Mr. Baxter, Leeds. *Cinderford, Feb.* 13, 1883.

Dear Sir,—I am pleased to be able to tell you that the Machine works splendidly. We are breaking 16 trucks a day now, and we thought it a good day's work to do 10 a day with the old Machine, so you can see the difference. I had a gentleman looking at it yesterday, and he was surprised to see it work so easily.
Yours truly, E. ORGAN.

The above refers to one of our 16 by 9 Machines we supplied to replace an "Improved Blake" 15 by 9 Machine.



GUARANTEED NO INFRINGEMENT OF ANY OTHER PATENT

AWARDED THE ROYAL MANCHESTER, LIVERPOOL, AND NORTH LANCASHIRE AGRICULTURAL SOCIETY'S SILVER MEDAL, 8TH OF SEPTEMBER, 1882.

FOR ILLUSTRATED CATALOGUE AND FULL PARTICULARS ADDRESS TO THE PATENTEES AND SOLE MAKERS,

W. H. BAXTER & CO., ALBION STREET, LEEDS.

Original Correspondence.

AUSTRALIAN GOLD MINES.

SIR,—At the present time when our gold supply is of such importance, and the subject of gold mining is apt to be met with disfavour in consequence of so many disastrous failures of ill-managed companies formed with the intention of mining for gold, it may not be uninteresting to give some account of the profitable nature of gold mining in Victoria, as represented by the undermentioned list of standard dividend mines now in active operation. It will be seen that six-and-half millions paid in dividends are from quartz mines, while less than one million sterling is represented by alluvial mines. Since the working out and flooding of the old alluvial mines on Ballarat that district has not contributed much under that heading but rests on the glory of its former magnificent yields from the alluvial leads that were worked under and around Ballarat, producing upwards of fifty millions sterling in gold. A correspondent in Melbourne who has acquired much practical and scientific knowledge of the resources of Australia as a field for enterprise, writes me as follows:—"For your use and information I enclose a list of the public dividend-paying mines in Victoria. The dividends given are simply those paid since the mines have been in public possession, and not those paid to the original private owners, the latter as you are well aware no inconsiderable sum when inexpensive mining at shallow depths was carried on. This list is for the month of June this year, and several companies that have paid dividends since, but not previously this year, are not in the list.

In my travels I see many valuable mines prematurely abandoned, owing to reckless expenditure in drink, &c., by the miners of the wealth got out, and for want of some of which to erect machinery the mines have been abandoned or let on tribute. I know of two or three really valuable properties now that could be obtained for a few hundreds of pounds sterling, out of which very large sums of money have been got up to over 100,000*l.*, and the reefs in them not worked to more than 150 to 200 ft. in depth. But you know although people at home, as we still call the mother country, may not be able to grasp it, we have boundless outlets for capital in this Continent, and too little capital and too few people to work up our natural resources, and fortunes lie begging.

This is not my usual strain of talk, but when I think of the opportunities here for capital to be profitably invested (in an English governed country) in mining alone that I cannot help it. Had we one-half the capital that went to India invested judiciously here I believe we could have paid them back the outlay twice over in this time. Even our best mines here are only reckoned at from two to three years purchase, and why is this? Because of the general demand for capital, and the forcing of the output to the neglect of development works. No doubt money could be well invested here and many of our mines would and do return the market price in full every two to four years, and I believe that by cautious purchase the greater part of many of our best dividend mines might be gradually bought up, and thus the management be obtained or sufficient power got to get the mines worked for the investors and not for the markets, up and down. The value of shares would then increase and be steady also. But I am still inclined to think that quite as good opportunities offer in buying cheap good mines that are next to abandoned through want of capital."

The following is a list of the Dividend Mines of Victoria for June, 1883:—

QUARTZ.

Name of Company.	No. of Shares	Limit of Shares.	Amount paid up per Share.	Dividends paid. Since May 12	Dividends paid. Total.
A 1 Perthshire, Stawell	15,280	£2 10 0	1 3 5	...	£ 7,194
Acadia Catherine, Sandh.	24,000	1 0 0	0 12 3	...	22,200
B. of H. & Alb. Con., Ballrt.	22,450	20 0 0	20 0 0	...	458,542
Band of Hope, Ballarat	12,000	0 5 0	0 1 0	...	20,500
Band of Hope, No. 2, Ballrt.	10,000	0 5 0	0 4 6	...	5,750
Band of Hope, No. 4, ,,	12,000	0 5 0	0 1 3	...	10,350
Black Horse, Egerton	10,000	2 0 0	1 5 6	...	68,000
Belmont and Saxby, Sandh.	30,000	1 0 0	0 11 6	750	58,500
Bruhn's Freehold, Sandhrst.	27,000	1 0 0	0 10 0	3,375	22,437
Clunes, Clunes	2,000	20 0 0	15 0 0	...	109,438
Catherine Reef, Sandhurst	67,600	2 0 0	1 1 6	...	44,495
Confidence Extended, Sand.	30,000	1 0 0	0 2 4	...	9,750
Cornish, Sandhurst	800	40 0 0	13 0 0	...	11,800
Cornish, Daylfd.	13,000	5 0 0	1 5 6	975	975
Crown Cross Reek, Stawell	19,044	2 0 0	1 5 6	...	30,232
Doyle's Rf., Reedy Ck., Kilt.	24,000	0 5 0	0 2 6	...	15,600
Duchess of Edinbgh., Sand.	24,000	0 5 0	0 3 11	...	15,000
Egerton, Egerton	25,000	4 0 0	3 15 0	...	276,660
Eastwood, Sandhurst	24,000	1 0 0	0 10 1	...	10,806
Ellenboro', Sandhurst	24,000	1 0 0	0 12 9	...	69,800
Ellesmere, Sandhurst	28,000	1 0 0	0 12 7	...	89,950
Extended Cross Rf., Stawell	11,220	2 10 0	...	...	96,211
	11,220	3 6 8	3 6 8		
Garibaldi, Sandhurst	28,000	1 0 0	...	...	36,100
Gt. Extend. Hustlers, Sand.	28,000	1 0 0	0 17 6	...	363,300
Gt. Ext. Hust., 1 Trib. ,,	28,000	1 0 0	0 3 0	...	194,600
Great Southern, Sandhurst.	34,000	2 0 0	0 5 0	...	8,975
Garden Gully Uni., Sandh.	33,517	1 0 0	0 12 11	3,351	778,041
Hercules & Energetic, Sand.	30,000	2 0 0	0 5 6	...	30,000
Johnson's Reef, Sandhurst.	28,000	2 15 0	2 9 6	...	130,199
Johnson's Reef Ex, Sandh.	24,000	1 0 0	0 14 8	...	3,000
Lady Barkly, Sandhurst	24,000	1 0 0	0 12 9	2,400	24,715
Langridge, Kilmr.	24,000	0 5 0	0 2 9½	1,200	16,600
Lazarus Co., Sandhurst	45,000	1 10 0	1 1 0	...	51,750
Lazarus, No. 1, Sandhurst	45,000	1 10 0	1 1 6	...	75,375
La Belle, Sandhurst	24,150	1 0 0	0 8 6	...	1,207
Londonderry, Sandhurst	800	25 0 0	17 16 0	...	20,800
Long Tunnel, Wihlla.	2,400	5 0 0	5 0 0	2,400	858,000
Long Tunnel Ext., Wihlla.	9,600	6 0 0	5 11 0	...	14,400
Napoleon Untd, Sandhurst	30,000	1 0 0	0 5 3	...	1,500
New Chum & Vic., ,,	25,000	1 0 0	0 10 0	...	43,125
New Chum Conso., ,,	28,000	0 10 0	...	1,400	90,300
New Chum Untd., ,,	29,500	0 10 0	...	737	12,537
New Era, Castlemaine	24,000	1 0 0	0 1 8	...	32,800
New North Clunes, Clunes	2,056	20 0 0	18 0 0	514	491,538
New St. Mungo, Sandhurst	24,000	0 5 0	...	1,200	1,200
North Band & Barton, Bairt.	24,667	1 0 0	...	...	7,500
North Johnson's, Sandhrst.	22,000	1 0 0	0 0 9	...	69,100
North Old Chum, ,,	27,000	1 0 0	0 12 0	...	63,175
North Shenandoah ,,	24,000	2 0 0	0 5 6	...	63,300
North Queen, Ballarat	12,000	0 10 0	0 8 9	...	1,200
New Koh-i-noor, Ballarat	24,000	0 10 0	0 6 0	...	33,700
Old Chum, Sandhurst	27,000	2 0 0	0 8 0	...	59,062
Park, Sandhurst	40,000	0 10 0	0 0 9	...	10,400
Parker's United, Grdns.	20,000	1 0 0	0 16 11	...	21,500
Phœnix Company, Sandhst.	24,000	0 12 0	0 5 3	...	8,500
Pleasant Ck. Cross Rf., Stawl	10,000	2 10 0	2 2 6	...	751,742
Princess Dagmar, Sandhrst.	24,000	1 0 0	0 8 4	...	10,200
Queen's Birthday, Dunlly.	6,000	1 2 6	1 2 6	...	207,000
Queen's Black Hill, Ballart.	10,000	0 10 0	0 5 0	...	6,750
Rising Star, Daylfd.	14,400	0 6 0	0 1 3	720	13,165
Rose of Denmark, Sandhst.	24,000	1 0 0	0 11 0	600	45,200
Sadowa, Sandhurst	32,000	1 0 0	0 7 9	...	8,800
Sergeant's, Ballarat	15,000	1 0 0	0 1 9	...	3,375
Shamrock Co., Sandhurst	30,000	1 0 0	0 17 0	...	9,750
Shenandoah, ,,	32,000	1 0 0	0 17 6	...	3,800
Smith's Freehold, Ballarat	24,000	1 10 0	0 1 6	...	7,700
South Clunes, Clunes	4,000	10 0 0	10 0 0	...	73,000
St. Mungo, Sandhurst	32,000	1 0 0	0 1 6	...	8,600
Sth. Catherine Reef, ,,	25,000	0 1 0	0 11 10	...	17,083
South Devonshire, ,,	24,000	—	...	10,800	...
United Devonshire ,,	28,000	1 0 0	0 15 11	6,300	28,200
Union, Amhrst.	10,000	1 0 0	0 18 0	...	3,250
Washington, Ballarat	12,000	1 0 0	0 3 3	300	26,400
Wilson's Freehold, Ballarat.	12,000	0 10 0	0 1 6	...	3,450
Hustler's & Redan, Sand.	48,000	1 0 0	0 2 0	...	111,600
Young Band Extend., Bairt.	12,000	0 10 0	0 5 0	...	14,400

ALLUVIAL.

Duke, Timor	25,000	£2 0 0	0 8 0	...	£ 7,500
Dyke's, Creswick	18,000	1 0 0	0 6 6	900	52,200
Hepburn Home Paddock, Creswick	6,000	2 0 0	1 0 0	...	17,550
	12,000	2 0 0	0 3 6		
Hobart Pasha, Beaufort	10,000	0 10 0	0 7 9	500	12,500
Lone Hand, Creswick	12,000	1 10 0	1 5 6	1,500	44,100
Loughlin, ,,	12,000	2 0 0	1 9 0	...	40,800
Madame Berry ,,	18,000	1 10 0	0 17 9	4,500	110,700
New Australasian, Creswick	10,000	2 0 0	1 2 6	1,000	68,750
New Discovery, Beaufort	16,000	0 10 0	0 9 6	...	3,200
New Victoria ,,	1,200	2 0 0	2 0 0	420	17,100
Racecourse, Haddon	9,000	—	2 3 9	...	28,950
Reform Haddon, 1st issue	2,000	4 0 0	4 0 0	...	...
,, 2nd ,,	2,000	2 0 0	2 0 0	...	42,000
,, 3rd ,,	4,000	1 10 0	0 5 0	...	...
Ristori, Creswick	12,000	1 0 0	0 11 1	3,600	165,400
Royal Saxon, Beaufort	12,000	0 15 0	0 10 0	900	4,500
Waterloo ,,	10,000	1 0 0	1 0 0	...	1,500
Working Miner's U. Home	20,000	5 0 0	...	...	20,000

Totals:—Quartz, 6,568,740*l.*; alluvial, 645,650*l.*=7,214,390*l.*

In the above list, which is greater than the list of home and foreign dividend mines as published in your Journal, I am acquainted with the position and history of the greater portion of the mines, and am thoroughly satisfied that not only will the output be considerably increased in many of them for years to come, but large sections of country, capable of affording profitable employment for capital and labour is still awaiting development, and that English investors will do well to devote their energies to Australian mining investments.

THOMAS CORNISH, M.E.,
"Author of Our Gold Supply; its effects on Finance,"
"Trade Commerce and Industries," &c.

CORPORATION OF SOUTH AUSTRALIAN COPPER MINES.

SIR,—Last week a telegram arrived from the Blinman Mine stating that in sinking the winze below the 60 fm. level a rich course of black oxide of copper, worth 100*l.* per fathom, had been met with. Since then another important discovery has been made in the same winze. A chasm, 3 ft. wide and 18 ft. deep, has been discovered full of water, with the sides of the crevasse coated with native copper. This discovery is interesting as showing that the pure copper on the walls was deposited by the electricity passing through the earth, operating on the copper held in solution in the water filling the chasm; being exactly the same process by which articles are electro-plated in a Birmingham manufactory. The 70 fm. level is being pushed on with all speed to meet the winze, and when this is accomplished and further particulars are received, I may again call your attention to the subject.—*London, Dec.* 6. T. A. MASEY.

ANNUAL MINING REPORT, 1882, NEW SOUTH WALES.

SIR,—The Annual Report of our Government Mining Department for 1882 has just been issued, and the following synopsis of it may possibly be of some little interest to such of your readers as have interests in the mines of the colony:—The Annual Report for 1882 of the Under-Secretary for Mines to the Minister of the Department was laid on the table of the Legislative Assembly last week. In his report Mr. Harrie Wood says: "During the year 1166 applications were made to lease parcels of Crown lands for mining purposes, being less by 163 than the number of applications made in 1881. Of the number of applications so made, 586 were for parcels of auriferous land, and 580 for lands containing minerals other than gold. The number of applications dealt with in 1882 was 896, which, as compared with the number dealt with in 1881, showed an increase of 5. Of the applications dealt with in 1882, 415 were for gold mining leases, comprising an area of 2358 acres; and 481 were for mineral leases, comprising an area of 16,745 acres, together equal to 19,103 acres, and exceeding the area contained in the applications dealt with in 1881 by 3030 acres. The aggregate area applied for was greater than that of the previous year by 3292 acres. But there was a decrease in the acreage for gold, antimony, coal and shale, copper and silver, manganese, and slate. No applications were made for bismuth, chromate of iron, cobalt, and galena. There was, however, an increase in the acreage for asbestos, coal, copper, limestone, silver, and tin; and there were applications for diamonds, opals, silver and lead, and iron, which did not occur in 1881: 357 applications were made for permission to mine under reserved lands, and 244 of such applications were dealt with."

Reference is then made to the loss of the valuable geological museum by the Garden Palace fire, and it is stated that after the fire circulars soliciting donations were issued by the late Secretary for Mines to foreign countries and the neighbouring colonies, as well as to all parts of New South Wales, in response to which many collections have been promised. From New Caledonia, New Zealand, and Queensland had already been forwarded typical collections of their rocks, minerals, and fossils, while in New South Wales the request had been most generously met, many gentlemen handing over their private collections; and on all sides universal regret had been expressed and active sympathy shown. Many of the country officers of the Department had also materially assisted in collecting and forwarding specimens. From Sept. 26 to Dec. 31 140 donations were received, many of them comprising large collections; since the latter date to March 31 the number had been increased to 203. Between the first-mentioned dates the number of specimens registered was 2712, which had been increased to 3668 to the end of March, 1883 (exclusive of many duplicates which had been labelled for the purposes of exchanges, collections, &c.). Two large collections from the Newcastle and Yass districts, as well as a considerable number of specimens of bones of extinct animals from the Wellington caves, now being dealt with, will increase this number to about 5000 specimens. Several thousand specimens of fossils, which can be identified, had been recovered intact from the ruins of the Garden Palace, which also materially swell the number of specimens at present in the temporary museum. A representative collection of the minerals of the colony had been prepared for exhibition at Amsterdam, and comprised large blocks of all the minerals of commercial value produced in New South Wales, besides smaller samples of numerous minerals and fossils.

Mr. Wood bears special testimony to the assistance which he had received from Mr. Herring, the chief clerk, and from Mr. Binny, the registrar, as well as the wardens and other officers of the Department.

The result of the mining operations for the year, on the whole, compared favourably with those of 1881. The following are the results of the year's operations, with the increase or decrease respectively, as compared with the year 1881:—Gold, 140,469·28 ozs., value 526,521*l.*, a decrease in value of 39,991*l.*; silver, 38,618·25 ozs., value 9024*l.*, decrease 4002*l.*; coal, 2,109,282 tons, value 948,965*l.*, increase 345,717*l.*; shale, 48,065 tons, value 84,114*l.*, increase 43,366*l.*; tin, 8669·18 tons, value 833,461*l.*, increase 109,458*l.*; copper, 4958·2 tons, value 324,727*l.*, decrease 30,335*l.*; iron, 7476 tons, value 37,224*l.*, decrease 10,646*l.*; antimony 1068·18 tons, value 16,732*l.*, decrease 614*l.*; lead, 11·19 tons, value 360*l.*, decrease 1265*l.*; asbestos, 7·10 tons, value 75*l.*; bismuth, 2·14 tons, value 162*l.*, decrease 2566*l.*; mixed minerals, 7 tons, value 979*l.*, decrease 41*l.* This, therefore, showed an aggregate increase for the year of 409,154*l.* 7s. 10d. The minerals which showed an increase in value as compared with the preceding year were coal, shale, tin, and asbestos, while the value of the output of gold, silver, copper, antimony, lead, bismuth, and mixed minerals in 1882 was considerably less than that of 1881. The aggregate value of our mineral products of 1882 was 2,782,344*l.*, exceeding the value of the output of any previous year, and exceeding the decimal average by 401,742*l.*

From the reports furnished by the wardens and mining registrars it was evident that the drought which continued through the greater part of the year seriously retarded mining operations throughout the gold fields. It is true that in some few localities the absence of rain enabled the miners to work portions of river beds which in ordinary seasons are under water, and are consequently inaccessible. But the drought and scarcity of grass rendered prospecting most difficult, if not entirely impracticable, until the breaking up of the drought in the last quarter, hence few discoveries of importance were made during the year. Though the output of gold for 1882 was less than that of 1881, it was larger than that of any previous year since 1876. The number of miners engaged in gold mining during the year, so far as could be ascertained, was 9215, of whom 7843 were Europeans and 1372 were Chinese. The earnings of each individual miner would thus average about 57*l.* 2s. 9d. per annum.

The output of coal for 1882 largely exceeded that of any previous year in quantity, and in value it exceeded that of any previous year except 1879, when the average price was higher by 3·0·33 per ton than last year. The average price last year exceeded that of 1881 by 2·2·42 per ton. The export of coal to both intercolonial and foreign parts, as also the home consumption, exceeded in 1882 that of any previous years. There was a very satisfactory increase in 1882 upon the average price of the whole output as compared with the two previous years, but the average prices obtained for export to intercolonial and foreign ports were not as high in 1882 as in 1880. During the year there had been several new coal mines opened up, and a considerable amount of work had been done in testing coal lands. The Diamond drill has been employed to test the seams of coal at Wyong Creek, near Gosford, at Cooranbon, near Lake Macquarie, at Long Swamp, near Marulan, and at the Holt-Sutherland estate. The average price per ton in the Northern district was 9 9·75 in 1882 as compared with 9·6 in 1881. The average price per ton in the Western district was 6 4·46 in 1882 as compared with 5·9 in 1881. The average price per ton in the Southern district was 9 11·33 in 1882 as compared with 9 1·25 in 1881.

Though the number of mines from which petroleum oil and Cannel coal was raised continued the same, the output of this mineral for 1882 greatly exceeded that of any previous year, while the price, as compared with the previous year, showed an increase equal to 5s. 9·41d. per ton.

The export of tin for 1882 exceeded that of any previous year in quantity by 470 tons, and in value by 109,458*l.* Though the operations on the tin fields were in some localities retarded by the drought, and at times by the want of sufficient miners, the mines on the whole had been fairly productive, and the high price of tin had enabled some of the old ground, which had been abandoned as unremunerative, to be re-worked with profit. There had during the year been a reasonable amount of prospecting, and the results had, on the whole, been satisfactory. In the Tingha district the output exceeded that of the previous year by 1000 tons, and the population, both European and Chinese, had largely increased. Tin was said to have been discovered at Little River, in the Oberon district, while in the Tumut district Messrs. Fitzgerald Bros. obtained 1¼ ton of stream tin from their gold claim on Sandy Creek. At Jingellic, in the Albury district, 25 miners were employed on the tin mines, where, in addition to stream tin, they had a valuable lode. Numerous tin lodes had been tested in the Vegetable Creek and Wilson's Downfall districts, but they had not yet been worked to any great extent, nor were they likely to receive the attention they merit while the deposits of stream tin continued so productive. Fortunately there was still a very large extent of country containing deposits of stream tin which had not yet been opened up, owing to the difficulties and expense of prospecting, the ancient river beds containing the tin being covered by layers of basalt of considerable thickness.

Though the export of copper for 1882 was less than that of the previous year, the prospects of this branch of mining were steadily improving, and copper mining promised to be one of the most important of our industries. It was quite true that the lodes in some parts of the colony, though rich near the surface, had not, so far as they had been tested, maintained their size to any great depth, and the ore had not only become poorer, but more difficult to treat; hence many lodes, which at one time gave great promise, had been abandoned. It is open to question whether even these lodes would not have paid if tested to a greater depth, and they may possibly yet be so tested. But, though some ventures had not been attended with success, there could be no question concerning the richness and permanence of the lodes in the Cobar district. In the Great Cobar Mine the deepest level was 324 ft., and the width of the lode at various points was from 50 to 70 ft. The output of ore for the year was 13,787 tons, of which 11,702 tons smelted produced 1805 tons fine copper, valued at 126,350*l.* In the Nymagee Mine the deepest level was 270 ft., the width of lode varied from 2 to 30 ft., the output of ore for the year was 7253 tons, 6618 tons of which smelted produced equal to 1144 tons fine copper, valued at 80,000*l.* In the Girilambone Mine the deepest level was 198 ft., the width of lode 6 ft., and the output of ore for the year 2000 tons. Only 10 tons of regulus were produced during the year, valued at 700*l.* At the Hartwood Mine, Nymagee, the operations had been confined to prospecting; the main lode had not, it was thought, yet been found, but they had a lode from 3 to 4 ft. wide. The shaft was 215 ft. deep, and the deepest level was 136 ft. Several rich veins had been cut in the main shaft: 70 tons of ore, estimated to contain 40 per cent. of pure copper, had been raised.

There was a marked decrease in the output of silver during the year 1882, due mainly to the difficulty experienced in treating the ore found at Boorook. The Warden reported that Messrs. Hall and Davy had two shafts, a main shaft 160 ft., and No. 1 shaft 155 ft., both stopped on account of the influx of water, which was too heavy to be kept down by means of a whip, and they were now erecting a whim. The lode in the main shaft was 4 ft. wide, composed of argentiferous pyrites, which averaged 50 ozs. to 60 ozs. silver, and 0·75 ozs. of gold per ton. In the No. 1 shaft the lode was 3 ft. wide, 10 in. of which was hard stone, containing blende, galena, and argentiferous pyrites, and would average 120 ozs. silver to the ton. Good silver ore was being obtained between the 70 and 140 ft. levels, and about 600 tons of the ore was at the surface. On the Addison lode stoping was carried on at the 30 ft. level, where the lode was 9 ft. wide, yielding a fair quantity of rich ore, some of which assayed 700 ozs. of silver and 5 ozs. of gold per ton. The reduction works at Boorook, constructed by or under the management of Mr. Davy, were nearly completed, and a first experiment had been made, which Mr. Davy regards as a perfect success. The Narrangie Silver Mining Company's shaft, near Denistown, was 95 ft. deep. The width of the road varied from 1 to 3 ft. down to 80 ft., where it pinched out, but it made again, and at 90 ft. had widened out to 2 ft. At Thackeringa and Umbormerka, near Mount Gipps, in the Albert district, extensive deposits of silver and lead had been opened up. Large quantities of the ore were found at or near the surface. The greater part, if not all the ore, was sent to Adelaide, *via* Torowie. Disputes and litigation concerning titles to the land had had the effect of retarding the development of these deposits, and the drought had prevented prospecting; but there was no doubt that, in spite of the drawbacks aforesaid, and the great scarcity of water, the lodes in this locality would be extensively worked in consequence of the richness of the ore, and we might look forward to the settlement of a large population in this hitherto sparsely-populated portion of the colony.

The Esk Bank Company continued to be the only makers of iron in the colony. The return furnished by the company's secretary shows that during 1882 they made 4320 tons of pig-iron, valued at 15,120*l.*, against 2737 tons 12 cwts., valued at 10,950*l.* 8s., in 1881; finished iron, 2139 tons 9 cwts. 2 qrs. 20 lbs., valued at 20,330*l.* 19s. 6d., against 3351 tons, valued at 31,056*l.* 12s. 6d., in 1881; and castings, 1016 tons 16 cwts. 3 qrs. 22 lbs., valued at 1773*l.* 3s. 3d., against 220 tons, valued at 4011*l.* 11s. 3d. for 1881.

During the past year the quantity of antimony ore exported greatly exceeded that of the previous year, but the quantity of metal exported was considerably less, the quantities being—in 1881, ore 302 tons 13 cwts., metal 236 tons 11¼ cwts.; in 1882, ore 1045 tons 14 cwts., metal 23 tons 4 cwts. This was probably due to the fact that from various causes some of our smelting works have been closed. The antimony lodes in the Kempsey district had been almost abandoned, but the warden reported that it was proposed to test them to a depth of 200 ft., when, if the results were satisfactory, proper appliances for working them systematically and on a large scale would be provided. He also stated that 120 tons of first-class, and 80 tons second-class ore have been sent to Sydney for smelting. The lodes in the Armidale district had been the chief source of our output during the past year.

Little or nothing had been done during the year to develope the asbestos mines, and the quantity of bismuth exported during the year was small as compared with that of the previous year. The slate quarries near Gundagai were being opened with great energy. It was reported that cinnabar, or red sulphuret of mercury, had been found in an auriferous alluvial drift six miles south-east of Cudgegong. The opal mines at Rocky Bridge were said to have been opened again during the past year. Some diamonds from the Bingera Mines had been purchased, with a view to testing their fitness for use in the Diamond drills as soon as a suitable opportunity occurred.

One passage reads as though we had petroleum oil (*sic*) deposits—it means, however, the mineral from which the oil is distilled here—but within the last few weeks a prospecting party has started for the southern portion of the colony to test an alleged oil spring there.

There has also been a late discovery—about 120 miles inland—of kerosene shale (as we call it here), which promises to be of some extent and good quality, a strongly-defined seam of 3 ft. thick having been fairly opened out in the two separate adjoining properties of Messrs. Lonergan and Co., and Melliday and Co., samples from which, when retorted, gave over 150 gallons crude oil per ton.

Whilst prospecting for this mineral some very good deposits of various iron ores were also found, all within easy reach of the Lithgow Ironworks, and a large lode of it specially adapted for steel is now being opened out on Munford's estate within a few miles of the works, and as our Government is now calling for tenders for 150,000 tons of steel rails the Lithgow people intend to try for it (or at least a good slice of it) as it is now proved that these are the right ores, and apparently sufficient of them to supply the works fully.

The old Fitzroy Ironworks (on the Southern Railway line) have also lately been again bought by some English speculators for 27,000*l*. The losses of the two previous owners arose from bad smelting coal and management (?)—for the ore is good and abundant—but the purchasers this time have at least this comfort, that the sale of the surface of the land alone gives them a splendid profit on their investment, as it is an easy distance from Sydney, and being 2000 ft. high, in a district eagerly sought after for villa residences, &c.

Pyrites is now being eagerly sought after for the English market, and many of the old abandoned gold mines are being prospected again for this very mineral, which 10 or 12 years ago was thrown aside as worse than useless. Hydraulic sluicing on the Californian principle has at last been established near Kiandra, and although scarcely more than clearing away of former debris and rubbish, and getting a face on the works, has as yet been done, the prospects are so good that the plucky shareholders who were laughed at at first now have the laugh on their side and can apparently well afford to do so.

Luckily for the working miner here the mining department also does its best to help him in seeking for the most likely districts, and in assaying free of cost the samples he sends it, and the synopsis does not give one word too much of praise to Mr. Harrie Wood (under secretary), and Messrs. Herring and Binney respectively for their courtesy and prompt attention to all enquiries, and in generally striving to advance the mining interest of the colony.

Sydney, Oct. 18. R. D. A.

NEWFOUNDLAND—NORTH-EAST COAST.

Sir,—It is a coarse rough spot, and it may with much appropriateness be termed a meeting place of the severities—rugged coast, rocky hills, boggy interior, trees frequently small and unsound, no prairies, no agriculture to speak of, no fruits but a few berries, fragmentary geology, minerals mostly scattered and patchy, no roads; climate eight months winter, and hardly any weather fit to be called summer. The chief industries of the country consist of cod-fishing, sealing, some fur trapping during winter, and copper mining. The cod fishery is carried on during the months of June, July, August, and September. There are hundreds of small craft, principally schooners, employed in this business in these months; each schooner carries a great many hands and several boats, which in the day-time are manned by the crew when they row off to the fishing ground, and then with hook and line set to work. The day's haul is either taken to the vessel or else to the shore, where the fish are cleaned, salted, and dried. With plenty of sunshine to dry the fish they are better than if cured in damp weather. The sealing season begins by law on March 10. The killing of the animals is forbidden until then on account that the old seals have their young on or before that date. At the time of the breaking up of the ice in the Arctic region the old seals get on to it to whelp, when by means of the Arctic current and the north winds they are carried southwards, and on their arrival on the coast of Newfoundland they are met by the different sealing fleets which are employed in this trade. Each vessel carries a crew of 40 or 50 men, more or less, and when sufficiently near they go on the ice with clubs and rifles, and the slaughter begins. The younger seals are usually clubbed, but the older ones being stronger and offering more resistance are shot. The pelts with the fat adhering to them are then stripped off, and packed on board the different vessels, and are subsequently taken to some suitable place, where the oil is extracted, and the skins prepared for tanning. The carcases of the seals, being of no value, are allowed to remain on the ice until it melts, when they sink into the sea. While writing of these mammals it should be mentioned that when first whelped they are perfectly white, and continue so until they take to the water, when they become darker and darker, until at last they have become a brownish-grey colour, and beautifully mottled on the back. The number of seals which float down the Arctic region on the float ice in the early spring may be reckoned in millions. Some vessels some years have been known to take so many as 40,000, and then, reckoning each pelt from 15s. to 20s., it is quite a little fortune for the ship, and also for the crew—seeing that the enterprise is carried out on the co-operative principle. But, after all, there is much uncertainty in connection with this business, as in some seasons the quantity killed is small, barely enough to cover expenses, and at times some of the vessels are frozen up in harbour, and cannot put to sea; then none at all are caught, which entails a considerable loss.

The first discovery of copper of any importance was made about 20 years since at a place known as Tilt Cove, situated 300 miles north-east from St. John's, the capital. It has been worked more or less successfully ever since. The ore is met with in a band of great width, and some years since large shipments of copper ore were annually made from it; but it is said that the bottom of the mine, which is 40 fathoms from surface, is much less productive than the shallower workings were. The outcrop, which is very massive, and stands a great height above the Cove, consists chiefly of gossan, and formerly large quantities of ore were worked from it.

Nine years ago another and larger discovery of copper ore was made at Betts Cove, which is distant about nine miles from Tilt Cove. For some time upwards of 20,000 tons of copper ore were annually exported, varying in value from 7 to 10 per cent., and for one year more than 40,000 tons of a similar quality were shipped from the mine to England. When, however, a depth of 400 ft. was reached the ore band became impoverished, and subsequently by careless working, now nearly five years since, the whole mine collapsed, and has ever since been in ruins. All the ore got from the mine since the disaster has been taken from the pillars formerly left to support the sides, and which are approached by drifting through the debris. Situated about 15 miles still further to the south-east of Betts Cove is the Little Bay Mine. This was discovered by the same owners as the latter, and worked by them for three years. Both this and the Betts Cove, however, were transferred to an English company in the autumn of 1881, and by whom they are probably still held. The Little Bay, when last seen by the writer, which is now many months since, was a good mine, and capable of yielding about 9000 tons of shipping ore per annum, worth from 9 to 10 per cent. of fine copper, or what would be equivalent to it.

Hitherto Tilt Cove, Betts Cove, and Little Bay are the only successful copper mines ever developed in the country. The copper ore of these mines is met with in one large pipe or chimney, from 250 to 300 ft. in length, and in bands consisting chiefly of chlorite slate, intersected with occasional small dykes of porphyritic granite or elvan. But the ore does not appear to extend much beyond the length mentioned; in a word, the deposits are isolated and not continuous through a considerable extent of country, as is the case with fissure veins. Further, these ore bands were first discovered with little or no mining whatever, inasmuch as they were denuded, and, consequently, observable on the surface. There are to be met with along the coast many large bands containing small patches of copper ore here and there, but not in sufficient quantities to invite capital for their development. Moreover, the outcrop of some of these particular bands, which the writer has examined, are too dense and devoid of cleavage for the production of much mineral; that is to say they are not fractured, nor sufficiently oxidised with iron, as is usually the case with productive copper lodes. In the case of the three successful copper mines above mentioned—Tilt Cove, Betts Cove, and Little Bay—their outcrops were altogether different, inasmuch as they were much broken, and at the same time contained large quantities of copper and iron pyrites. Further, it would effect a great saving of capital if mining people would only pay more attention to the natural indications of the formation of copper ore deposits, instead of spending large sums of money on a few isolated stones of ore, which by-the-bye are to be met with almost anywhere round the coast.

The people occupy only a ridge of the coast line. The interior of the country is not inhabited, as it offers no means of support; it is too sterile, with very little land capable of cultivation, and had there been any such land the summers are too short to allow anything to ripen. During the period of the spring and the summer months the chief occupation of a large proportion of the population directly and indirectly is sealing and fishing, as already referred to, and when the season is over they sell their produce, together with what furs may have been trapped in the previous winter, to the traders of the country; this enables them to lay in a stock of provisions to last them until the following year.

Next follows the long dreary winter, beginning in October and ending in June; then with no roads by land and the sea frozen there is no getting away from the place. There is no opening in the outer ice-ridge by which we can escape—no passage for the snow-shoes; while out beyond where the turbulence of the more open sea resists its freezing are the ponderous icebergs marching past. Imprisoned for several months in such a wilderness of ice and snow creates a feeling which is only experienced by exiles. Yet, with all these natural disadvantages, we cannot turn away without one word of gratitude. Here the stars glitter down through the frosty atmosphere with a brighter brightness; the moon shines with a more intense lustre; while the northern lights, like silent artillery, are shooting upwards in quick succession immense volumes of vapour of varying colours, some lurid, some reddish, and others with the more pleasing hues and tints. At times during, for instance, a night of their greatest activity they appear to be rushing up from across the whole breadth of the Arctic circle, and ascending to different altitudes, many of which reaching the zenith then drooping southward, forming at last a span from one horizon to the other; and, although it is midnight, the place is lit up as if the sun were up behind the hills. The most striking beauty of the phenomena is in their ascent, as then they are more vigorous, and the transitions are so sudden that before there is time to express full admiration of an ascending column, which is ever changing into other shapes and hues, causing it at one and the same time to be most fascinating yet bewildering. Spectators of the sublime grandeur of these lights on such occasions as those just mentioned would all naturally conclude that away within that innermost circle of the Arctic region from whence they issue there is force and activity—a force latent amongst the eternal ice crags of that awful inorganic solitude of which hardly any practical knowledge has yet been achieved. R.

Camborne, Dec. 3.

THE MINERAL RESOURCES OF UTAH.

SAN FRANCISCO MINING DISTRICT, AND PINE GROVE MINING DISTRICT.

Sir,—On the high dividing ridge between the Beaver Valley and the Wah Wah Valley, in Beaver County, Utah, is a short range, running north and south, called the San Francisco Mountains, having three principal summits, differing more or less in outline and appearance, and entirely distinct in their age and character, Their altitude is medium, that is, not great. The one farthest to the south is called Grampian; this is the lowest of the three, and rises about 1000 ft. above the valley. The Grampian Mountains consist of stratified sedimentary rocks, which is quartzite and limestone, the middle one being granite, and the highest and northernmost of these three summits is composed of trachytes of volcanic origin. These sedimentary rocks were originally deposited under water in horizontal beds or alternating strata of sandstone and limestone, which were transformed by great heat and enormous pressure—the sandstone to vitreous sandstone or quartzite, and the limestone to dolomitic marbles. This whole formation was subsequently rent asunder, one part being raised up and tilted back by powerful volcanic agencies, thus forming the mountains as we observe them, and as they appear to us at present—its eastern face presenting a cross section of these strata 1000 ft. thick, and now dipping westward into the mountain at an angle of inclination of about 20° below the horizontal. That portion of the formation from which this mountain was detached either remains in its original horizontal position or sank down and was subsequently severed with the trachytes that flowed over it and against the eastern base of the granite mountains and the eastern and southern base of the Grampian Mountains, and now forms a sort of undulating, waving plains, extending for some distance eastwards. The quartzite and dolomites are in contact with the granite on the north, on a line running nearly east and west, and also in contact with the trachytes on the east and south side of the mountain. The mines are in the latter contact at the eastern base of the Grampian Mountain, the footwall being massive layers or beds of quartzite and dolomite and the hanging-wall trachyte, and in the centre of a great mineral belt or district. The veins or lodes are distinctly traceable over the surface along the entire eastern base of the Grampian Mountain to the granite on the north, a distance of about 1½ mile, the course of the veins or lodes being north 10° west and south 10° east magnetic. The mines are at the very centre or focus of this great upheaval, where all the geological evidences point to a continuance down to the deep.

Adjoining the Grampian Mountain on the north is another, somewhat higher and quite different in appearance, character, and age, being formed of granite. Beyond this is, as mentioned above, another, which is the highest of the three, entirely distinct in aspect, character, and formation, consisting of a pale purple trachyte, and at one time molten and liquid, purely volcanic product.

The flow of trachyte extended along the eastern and southern base of the above-described mountains, forming more or less of a plain; and, although the surface is now mostly covered with drift, the trachyte appears in place at several points, and forms a distinct wall to the south. We have thus a contact between trachyte and granite, succeeded by a contact between trachyte and metamorphosed sediments—quartzite and dolomitic marbles—and in the contact occurs the bonanza, or horn-silver. All of these "contacts," if thoroughly prospected, will, without doubt, produce many more bonanzas, equal in value to the now renowned horn-silver. The town of Frisco, a mile easterly of the mines, is built on an extinct crater filled with volcanic ashes and tufa. It is evident that this crater was once the valve through which the volcanic forces came directly to the surface from below, through the great fissure made by the break in the limestone and quartzite; this fissure, following the contacts, forms the veins or lodes. The principal mines of San Francisco district are:—The Hornsilver, which is the original location on the main lode, having several extensions north and south; Carbonate, Cave, and Cave Extension, Comet, Morrison, New Haven, Cactus, Silveropolis, Rosa, Bradshaw, Woolcott, Dexter, Cyprus, Grampian, Jay Hawker, Sharman, Florida, Dolly Mack, Triangle, Antwerp, Vanderbilt, Governor, Rattler, Dives, Summit, Hoodoo, Americus, Lulee, Massachussetts, Quartzite, Bonanza, Niagara, Morning Star, Hope, Grampian, Colburn, Great Republic, and Young America.

As it would take too much space and time to describe all of the above mines, I will here confine myself to the leader, "the Hornsilver." The vein is traceable for several miles, from the south-eastern end of the Grampian Mountain to the point where the dolamite gives place to granite. The width of the vein at the Hornsilver discovery is from 40 to 60 ft., showing galena in places all throughout the length of the claim. The vein dips north 80°, east magnetic, at an angle of inclination of about 70° from the horizontal. The footwall of the lode consists of quartzite and limestone beds, and the hanging-wall of partly decomposed trachytic material.

From those facts it will readily be seen that the dip and strike must vary at points, especially there where the softer parts—the dolomite—are more readily decomposed and eroded than the quartzite. Therefore the width of the lode varies in places. Both walls are covered with a dry ferruginous clay, which serves as an indicator of the lode and the walls thereof. The hanging-wall of said lode has been penetrated for a distance of 200 ft. or more. The following material is thereby disclosed, adjoining the ore 20 to 25 ft. of clay, stained with oxide of iron, then 30 ft. of tough blue clay, merging gradually into a decomposed trachytic mass of a reddish grey colour. The lode itself contains in its enormous vein fissure two general classes of material. The larger portion is what is termed smelting ore; this is soft and earthy, consisting of sulphate, oxide, and carbonate of lead, carrying silver. The smaller portion is heavy spar (sulphate of baryta), carrying chloride of silver sulphide of silver, and ruby silver. The sparry ore is found on the side of the hanging-wall in the upper part of the vein, and has resisted decomposition on account of its position in the lode, and on account of the refractory nature of the material composing this kind of ore. All the other ore of this immense vein has undergone oxidation and other changes. There is no doubt but as depth is gained the ore will be found in its original condition—that is, in the form of sulphurets. Remarkable is the absence of wall material, so called horse, in the vein filling. All is ore from wall to wall, and silver-bearing. This lode will remain dry to a considerable depth. Assay value of the ore $60 per ton. Daily production, 110 to 150 tons of ore. Net profits, $20 per ton. The ore body contains 280,000 tons of ore in sight, representing a value of $16,000,000. The amount of ore extracted up to date is 150,000 tons. Dividends paid in the past up to date amount to $2,700,000.

W. Bredemeyer, M.E. and C. E., U.S. Surveyor.

MINERAL RESOURCES OF NORTH CAROLINA—THE BOSTON EXHIBITION.

Sir,—As it is to the interest of those owning undeveloped minerals in North Carolina that the great facilities for profitable mining which the State enjoys should be as widely known as possible I subjoin a very full abstract of the report given in the Engineering and Mining Journal of New York of the North Carolina exhibit at the Boston Exhibition, and trust that it may assist in bringing more capital into the State for the working of the mines. The reporter recognises the necessity for outside capital, and shows that the exhibit is likely to attract it; he says that occupying the centre of the spacious building it richly merits the attention which its conspicuous position ensures it. It is to most people a genuine surprise to see the wonderful diversity and great value of the products of the old North State, showing as it does, in addition to its valuable agricultural products, a great variety of most beautiful building and ornamental stones; woods which fairly captivate the eye; immense, lustrous, and most precious gems; iron ores at once so rich and pure in large and thick deposits, and at least in some cases in close proximity to coking coal, limestone, and transportation; copper sulphurets, from the common cupreous pyrites to the chalcocite (copper glance) of the Blue Wing Mine; gold quartz with most attractive labels, though of course telling little to the eye; and a wealth of other mineral matter, of great promise—graphite, prolusite, chrome iron ore, and others. But with its wonderfully rich and varied natural resources, North Carolina is "land poor." It needs both capital and skilled labour to enable it to avail itself of its own riches. In sending this wonderful display to the Exhibition she has taken a wise step, teaching by an object-lesson not easily forgotten what great opportunities she offers to capital and enterprise.

The first place is naturally given to the Coal Fields. The State has two coal districts, the Dan river, mainly in Stokes and Rockingham counties, near the middle of its northern boundary; and the Deep river district, mainly in Chatham County, near the centre of the State. The area of the Deep River field was estimated by Emmons at 300 square miles. Its principal seam is 6 ft. thick, or 7 ft. 6 in., if we include a small bed 18 in. thick, separated from the main bed by a layer of shale and black-band iron ore, also about 18 in. thick. The coal is a strongly coking one, swelling and melting in the fire. It is said to be excellent for forge use, for steam-raising, and for gas-making. The coke exhibited made from it is very fair, porous, hard, and quite resonant, apparently equal, if not superior, to the best Colorado coke in its physical properties, and, if we may judge from the analyses of the coal, much freer from ash and sulphur. This coal derives great importance from its close proximity to very extensive iron deposits. The occurrence of a large bed of black-band ore in the coal itself, and of a bed of the same ore, practically 6 ft. thick closely underlying the coal, is in itself a matter of no small importance. Of the coal of the Dan river district not so much is known. It is a dry, semi-bituminous coal, and its appearance is by no means as inviting as that of the Deep river coal. Still, its existence in known beds of great extent and of workable thickness in close proximity to the very important group of iron ore deposits which contains the Rogers bed below at once rich, perfectly pure and extensive, assures its value. The area of this coal field is considerably less than that of the Deep river field, and the greatest authenticated thickness of any of its beds seems to be 3 ft., though it is possible that at least one of the three chief seams may in places exceed this size.

Of Iron Ores there is a most imposing array, not less than 28 mines being represented by fine specimens. The western half of the State is well dotted over with valuable iron deposits, most of them wholly untouched. We are told by Prof. Kerr that iron exists in workable beds in 30 counties; but for convenience we may group the greater number of the most valuable known mines into four geographical divisions. First we have the iron regions of Granville, Chatham, Guildford, and Stokes Counties, lying to the north of the centre of the State, within reasonable distance of the North Carolina coal fields, and containing among other valuable deposits the thick and pure Buckhorne, Ore Hill, and Chapel Hill beds, and the extensive series of titantiferous deposits of Guildford County, of remarkable thickness, purity, and richness. Next we have the deposits of Gaston, Lincoln, and Catawba Counties, lying to the west of the centre of the southern border, with beds like those of the Big Ore Bank, of Yellow Ridge, reported to run to a thickness of 16, 18, and even 40 ft. In the north-west corner of the State, in Ashe, Caldwell, and Mitchell Counties, is yet another series of beds, the famous Cranberry deposit standing at the head, with its almost fabulous thickness, and its entire freedom from phosphorus and sulphur. Finally, in Cherokee County, in the extreme south-west corner of the State, we have deposits as yet but little known, but reported to be very thick. The ore of these western groups have the advantage of being within a moderate distance of the coal fields of Tennessee. The number of beds, which are at once rich, pure, thick, and comparatively accessible, promises much for the future importance of North Carolina as an iron-producing State.

Of Copper Ores perhaps the most attractive exhibit is the very rich copper glance of the Blue Wing Mine, of Person County, very free from gangue, and said to be from 3 to 4 ft. thick. It should be a most excellent smelting ore, and if the information given about it is accurate the mine should be of great value. Of the Gillis Mine, in the same county, great things are told. From the adjoining county, Granville, there are fine looking ores, siliceous copper glance, which appears to be the characteristic ore of this promising region. From the centre of the State the Cid and Conrad Hill Mines, of Davidson County, and Clegg's Mine, of Chatham County, are represented by rich chalcopyrites, with quartz gangue. From Mecklenburg County, near the centre of the southern border of the State, come rich, solid, cupreous pyrites, free from gangue. The celebrated Ore Knob Mine of Ashe County is not represented. It is generally known that a large proportion of the North Carolina gold mines, or mines which at the surface carry only gold, grow rich in copper as they approach the water-line, until in many cases copper becomes the metal of greatest value. This is especially true of the gold deposits of Guilford, Cabarrus, and Mecklenburg Counties, in and to the south of the centre of the State. What with the very considerable deposits of the copper alone, and with the extension of the gold mining industry in North Carolina through the application of improved metallurgical processes to the refractory ores which formerly defied the arrastra and Chilian mill, this State should at no distant day become one of our chief copper producers.

Of Gold Ores there is a very large display, chiefly of gold quartz. Gold is very widely distributed through the State, being found in workable quantities in no less than 29 counties, covering nearly all but the eastern 100 miles or so. It is generally found alloyed with silver. The greater portion of the more important deposits is situated on a granitic axis which runs north-easterly across the State, passing a little west of its centre from Mecklenburg County on the south to Caswell County on the northern border. Gold mining is now most actively prosecuted in Davidson County, which is a little west of the centre of the State. Besides several smaller mines which are actively worked, we have here the Conrad Hill, which is said to be the best equipped in the State, having an ore which is said to average from $17 to $20, and smelting it concentrates with Connells-

ville coke. In addition to their contents in precious metals, the concentrates are said to carry from 3 to 30 per cent. of copper. Here is also the Silver Valley Mine, said to be turning out 10 tons daily, and having besides 20 stamps, nine buddles, and other concentrating apparatus. The concentrates are said to run from $13·30 to $154·28. Gold mining is also actively carried on in Rowan County. The Reimer Mine, near Salisbury, is from 4 to 8 ft. thick, and is said to carry from $11·32 to $126·77. The sulphurets are roasted in fixed reverberatories, treated by the Mears chlorination process, and the gold is precipitated on charcoal.

The Gold Hill Mine, near Salisbury, is estimated to have produced $2,000,000 in precious metals. It has reached a depth of 750 ft., and is provided with 20 stamps and four amalgamating barrels. Its ore is said to carry from $4·53 to $255·71, as usual rather a broad margin, and we are not told nearest which of these two figures the average lies. The Phœnix Mine has an ore said to run from $10 to $85. It is said to have chlorination works for 10 tons daily, with 10 stamps and three rotary roasters. In Mecklenburg County the Baltimore and North Carolina Mine has an ore body from 1 to 4 ft. thick, carrying from $20·95 to $31·82, besides considerable copper. In Ashe County the Copper Knob Mine is 135 ft. deep, and from 20 to 42 in. thick. Its concentrates are said to carry $79·75, with 37·5 per cent. of copper. The first gold mines in the United States were those of North Carolina, and prior to the discovery of California the largest nugget of gold ever known was found within its borders, in Cabarrus County, reaching the then fabulous weight of 28 lbs. Had anything like the energy and intelligence that have so wonderfully developed the resources of California been concentrated on the gold deposits of North Carolina the treatment of the precious metals there would have been to-day an industry of colossal proportions.

There is a very beautiful display of building stones, and there are two marbles exhibited which deserve the highest admiration—a beautiful flesh-coloured marble from Red Marble Gap, and a delicate grey marble from Valley river. The former is fine grained, and of a colour which rivals the *giallo antico* of Italy in beauty and softness, although of a very different hue. Its tint is really most charming. The latter is of a uniform, very delicate grey, and almost as fine as the Italian Carrara marble, and as beautiful. From Patterson comes a large block of dark serpentine, highly polished, and of a wonderfully rich deep lustre. There are, says the reporter in conclusion, several cases with most fascinating displays of cabinet specimens; crystals of emerald of fabulous size; enormous mica crystals; sheets of mica perfectly transparent, and as white as any glass; well-shaped garnets over 6 in. across, and many other rare and beautiful minerals. HENRY MOON, M.E.

Thomasville, North Carolina, Nov. 20.

THE WAVE-PLATE AMALGAMATOR.

SIR,—Permit me to explain, and I believe the explanation will be of interest to the readers of the *Mining Journal*, in what particulars my wave-plate amalgamator differs from others, and how it accomplishes what others have failed to do. Sulphur is one of the greatest obstacles to the amalgamation of gold with quicksilver, for it interferes with the action of the latter, and prevents its uniting with gold whenever the gold is in combination with it. Now sulphur is rarely found pure when near other metals, but is most frequently found combined with iron, and forms sulphate of iron, or with copper, and is then termed sulphate of copper. As thus found it does not in the least degree hinder the working of my amalgamator, nor does it hinder the amalgamation of gold and quicksilver in it.

My experience in working gold ores convinces me that in those combinations it would not interfere with the amalgamation if the gold could be brightened or roughened. Now, this is exactly what my amalgamator does, and thus prevents any loss of gold, because the trials of my patent wave-plate amalgamator at the Conrad Hill Mines were directed to that point, and the most severe test by chemical assay only gave such a few grains of gold on the ton of ore treated that it was not worth testing it when the machine was called on to do at least 40 per cent. more work than it was calculated to do—over 7 tons in 12 hours, instead of 5 tons.

Long before the trials at the end of September and the beginning of October, I had stated what I believed would be the result, but no one believed me, saying that I had had no experience with these sulphate ores. I, however, maintained my opinion, which these trials have proved to be correct. I was also told that the water would wash the fine float gold away, I therefore placed a chip of wood in the machine where the quicksilver is made to play, and the result was exactly the same as I had witnessed in the water just below the great falls at Niagara—a tendency for a boat to go toward the falls, instead of down the stream, and in my amalgamator it goes toward the wave-plate, and is engulfed in the wave of quicksilver, and so secured. I have thus proved two things that I foretold—that the sulphur was no obstacle and that float gold would not wash away, but be saved by the quicksilver, and I have thus demonstrated that my amalgamator has overcome difficulties that hitherto had been found insurmountable in every other amalgamator.

I have always held the opinion that the amalgamation of gold with quicksilver is a mechanical rather than chemical action; or, perhaps, it is better described as a chemical combination produced by mechanical means; this union can only take place when the two metals are clean, on the surface of the one (gold) and in the body of the other. It somewhat resembles the action of iron and the magnet, only in that case they do not unite and form one substance as do gold and quicksilver, for a shake or a rub will separate them; but gold and quicksilver can only be separated in a retort, when the heat will sublimate the quicksilver, and it can be caught in its original purity in water, and the gold is left in the retort ready for smelting and purifying. I have always believed that the free action of the four ingredients, gold, quicksilver, crushed ore, and water, in my amalgamator, would secure the desired results—the union of the gold and quicksilver in the form of amalgam, and that the water would wash away every other ingredient, for every fresh supply of water comes with the crushed ore, so the constant supply of ore and water and gold keeps the amalgamator working on as long as these are supplied and the motion continued.

It certainly is very gratifying to have succeeded where all previous efforts have failed, and I sincerely hope and believe that this introduction of a machine that will save all the gold, and dispense with all attention and much labour, will be the beginning of prosperous times for miners in the State that, previous to the discovery of gold in California in 1848 and in Australia in 1850, had produced more gold and the largest nugget ever found in the same limited area.—*Thomasville, N. C.* HENRY MOON, M.E.

BRAZILIAN AND CALIFORNIAN TAILINGS.

SIR,—I do not think Mr. Morris has made the "tailings business" very clear. There is a vast difference between the rich sulphurets of the California quartz mines and the poor tailings of Morro Velho. In working at the Santa Maria, the Mina Rica de los Flores, Big Blue and Sumner, the Ferguson and Wallace, the Calaveras, the Soulsby, and the Vulture Mines, and at the Dayton Works—all of these places he worked at a profit, he furnishing to each machinery costing over 4000*l.*, and of course I cannot dispute his word, and I will believe that his gains have been large. But with this view of the case will not the St. John del Rey Company encourage him to put up machinery at his own cost? Even throw in the 4000*l.* worth that they have paid for and divide that profit of 195,800*l.*, a share of that sum such as Mr. Morris allowed to certainly seven proprietors—from 25 to 65 per cent. (say) strike an average, and call it 45 per cent.—there would be a very large sum for shareholders who are now waiting for something to turn up. I have had considerable experience in mining and milling work. I have owned and worked quartz mills in California, and while there I had numerous propositions for treating my sulphurets, but none that covered the cost of machinery. I know one of the mines to which Mr. Morris refers, and I have seen it very rich and very poor. Unless tailings accumulated very rapidly after I left California this mine had few tailings to justify anyone to expend more than 4000*l.* for their treatment.

The Morro Velho ore is worked very close, far more so than anything in California; the tailings are very poor. I stick to my opinion that they will not pay a profit by any mode of treatment. The company have the machinery, and unless Mr. Morris must personally superintend they can go on and experiment. I did not mean to intimate that Mr. Morris had not acted straightforward; but for a practical mining engineer and metallurgist he is most visionary, and his calculations are only exceeded by the writer of the letter on the "King of Gold Mines," who was not a practical miner, but a London miner.

I am content to wait and let time prove what I have said to be true, although I should be very glad to know of any success in the treatment of refuse tailings. In the interest of mining I hope the St. John del Rey Company will make friends with Mr. Morris, and allow him to attack that 225,000*l.* worth of tailings at his own expense; indeed, I think the shareholders should demand that the little differences between Mr. Morris and the manager, Mr. Oldham, be settled in order that they may get within four years' time the snug sum of 195,800*l.*, or their share of it, as I suppose Mr. Morris would want, and he would be entitled to (say) 10,000*l.* a year—40,000*l.* I trust that Mr. Morris will not think that I intended to make an attack on him; indeed, I thought he saw failure very plainly before him before leaving Morro Velho. MINAS.

Ouro Preto, Nov. 5.

ST. JOHN DEL REY MINING COMPANY.

SIR,—I regret very much to see that my name has been used by Mr. John Schofield in a letter which appeared in last week's Journal, and I feel it a duty to my fellow-shareholders to state that that gentleman had no authority whatever to pledge my attendance at any meeting convened by him, or to use my name in the way in which he has no doubt inadvertently done. If my knowledge of the affairs of the company can be of service in any legitimate endeavour to improve the present lamentable state of affairs I shall be quite willing (having a considerable stake in the undertaking) to render all the assistance in my power.

I cannot, however, think that attacking the directors either collectively or individually is likely to improve our position as proprietors; I should rather be disposed to join, if desired, in a properly organised examination into the present position and prospects of the company, and the best way of improving matters in Brazil, in the interests of the general body of shareholders. If after careful investigation it is found that the policy adopted and mode of administering the company's affairs during the last five or six years have been prejudicial to our success, by all means let that policy and administration be changed and a better one substituted.

Longridge-road, S.W., Dec. 6. J. N. GORDON.

VOLUNTARY LIQUIDATORS, AND QUARTZ HILL GOLD MINING COMPANY.

SIR,—My attention has been called to Mr. Beall's letter, in last week's *Mining Journal*, under the above heading, from which it would appear that he insinuates that the liquidators of the Quartz Hill Company have, or ought to have, a large amount of money in hand which could be distributed amongst the shareholders. He also refers to proceedings "which the liquidators were advised to institute at the time of their appointment." Mr. Beall, as a shareholder, knows that the company went into voluntary liquidation simply for the purpose of reconstruction; that the Denver Company took over all its assets and liabilities, and that the liquidators, therefore, had no accounts whatever to present. The liquidators, moreover, never were advised to institute any proceedings whatever.

To a person of ordinary intelligence it ought to have been clear that it was really quite unnecessary to hold any meeting, as it could not be other than formal, and all the information Mr. Beall pretends he wanted to obtain would be given to the shareholders in the Denver Company. However, Mr. Beall thought fit to raise the question, and rather than give him the opportunity of taking, upon a purely technical point, any other proceedings against the company the meeting was held. * * *

Gresham House, Dec. 6. C. H. DUNHIEL, Liquidator.

MONTANA QUARTZ MINES.

SIR,—The quartz ores of Butte are all in true fissure veins, in a granite formation, crossed in places by dykes of porphyry, which appear to have some connection with the mineral deposits, in some cases cutting the vein in two. The granite is the ordinary kind seen in almost any country. The lodes are from 2 ft. 6 in. to 80 ft. wide, and in many instances containing pay ore from hanging to foot wall; but generally having pay streaks varying from 1 ft. upwards. The surface ores are decomposed, the copper showing green and blue carbonates, and the silver either in a free state or as a chlorite, or mixed up with other base metals. The copper occurs as oxide, bromide and other minerals, such as black manganese iron, also sulphur, arsenic, and antimony. The copper ores are generally known as glance and what geologists call bornite or peacock, also called horseflesh copper ore, and carries from 20 to 65 per cent. of copper. Some of the mines, such as the Alice, Lexington, and many others, there is but little copper. In some instances the copper glance has taken the place of the sulphides of silver, and carrying 10 to 70 ozs. of silver and a large per cent. of copper.

The metals are supposed to be leached from many of the surface ores; but there are many instances where they pay from the grass roots. The lodes are well defined, having solid granite walls, with occasional seams of what in England is called flookan, or clay, and dipping at an angle of 50° to 80° south, and running east and west. The low grade ores are all concentrated in the immediate neighbourhood, where there is an abundance of wood and water. The price of wood delivered at the works is $4·50, and coal is brought in by the Utah and Northern Railroad at $7·50 by the car load. The Anaconda Company run their smelting and concentration works by water-power alone.

The first-class ores are shipped to Swansea, the next is smelted into matte and shipped. The milling ores are chloridised in Howell cylinder roasters, amalgamated, and turned into silver bullion. In some cases, as the Lexington, there is sufficient gold to considerably enhance the value of the bullion. Direct-acting steam-pumps are generally used for keeping the mines clear of water, the Dean differential plunger sinking pump giving the best satisfaction; but two Cornish pumps have even been put to work in Montana, the first by the National Mining and Exploring Company in their Union Mine, near Helena, the other in the Moulton Mine, Butte; the water in the deepest mines at Butte will not exceed 50 gallons per minute. The Montana Copper Company are down 300 ft., with their three compartment shaft have 22 ft. of ore. The output of the mine is 100 tons per day, giving 35 per cent. copper and 15 to 50 ozs. of silver; 25 tons of matte are shipped daily, giving about 70 per cent. copper. The smelter is connected with the railroad. Their other claims are not worked, their supply being more than sufficient to keep the furnaces going.

The Parrott Copper Company are taking out the ores from the 300 ft. level, having in their three parallel veins from 3½ to 12 ft. of ore; they ship 12 tons of matte per day. This company use their own copper.

The Anaconda Mine is owned by Haggin and Tevis, of California, and has a ledge 40 ft. wide, and can produce 500 tons per day. The shaft is being sunk 1000 ft. The machinery is the largest in Montana, a 500 smelter and a 250 ton concentrator are about completed. Their first-class ore is all shipped to Swansea. The Northern Pacific are making preparations to extend their railroad to the mine. The Original, west of the Parrott, has a 400 ft. inclined shaft; the ores contain less copper, being essentially more of a silver mine, and pays its regular monthly dividends; the ores are worked at the Colorado smelter.

The Lexington, owned 12 months ago by A. J. Davis, and sold to a French company for $1,500,000, and 15 per cent. of the stock, is developed by a three compartment shaft 500 ft. deep, and produces 60 or 70 tons per day, which requires chlorodising, and mills $60 per ton.

The Alice, owned by the Walker Brothers, of Salt Lake City, are down 800 ft. and are busy driving to the main ore shoot. The ore from their upper levels, which at present is their principal source of supply, averages 50 ozs. A large quantity of ore comes from the Magna Charta, which is owned by the same company, and mills about 40 ozs. The shaft is down 600 ft. Their hoisting machinery is very complete. The two mills of 60 and 20 stamps dry, crush about 90 tons per day, producing $90,000 to $100,000 per month.

The Moulton Mine has a three compartment shaft, 500 or 600 ft. deep, and having a fine 16-in. Cornish pump in position. The ores are worked in their new 40-stamps mill, having two Howell cylinders for chlorodising; 30 to 40 ozs. of silver and some gold is what the ore runs.

The Silver Bow Company own many patented claims, a few only of which are being developed under the management of A. J. Davis.

There are many other mines working with equally good results, and hundreds of others in the hands of parties unable to develope them for lack of capital. Butte has a population of 9000, which is rapidly increasing on the completion of the branch road to Butte. Bullion and matte will be shipped to Liverpool at $20 per ton. The output for 1882 was $6,882,000, and, as already estimated, for 1883 will be nearly double. The capital invested as yet is small, and at present working expenses high. Miners receive $3·50 per day, labourers $3, mechanics $4·50 and $5, board and lodging $28 per month. With lower freights Butte would soon open up more paying lodes than any mining district in America. JOSEPH CODLING, of Butte, Montana.

London, Dec. 5.

FREE TRADE, AND LOW PRICE OF METALS.

SIR,—Your correspondent, "Leader," regrets, as well he may, the low price of lead. The cause is very obvious, and its removal quite simple, if the policy, falsely termed Free Trade, were, as it ought to be, set aside. The home industry of lead mining is ruthlessly sacrificed in order that a few owners of Spanish lead mines may enrich themselves. The benefit of cheap lead to the nation at large is infinitesimally small, but to the home lead mine owner it means ruin, and to his miners semi-starvation or exile. A protective duty of 10*l.* per ton on foreign lead would set every lead mine in the kingdom in full operation, and would support in comfort and well-doing at least 50,000 of the working class, including working miners and their families. Of the 36,000,000 of our population 35,750,000 would never even feel the rise of price in lead, and the 250,000 who would feel it a little would soon accommodate their business to the altered price. Nobody as a rule cares whether lead is 12*l.* or 22*l.* per ton. There are no clamorous mobs shouting for cheap lead as they reasonably might for cheap food.

No wise Government would permit an important home industry like lead mining to be stamped out to satisfy the ideas of a Bright or a Cobden, and to enable the foreign capitalist to rob the British home workers of their livelihood in order that the well-to-do upper classes may have cheap lead. France has had strict protection of her home industries for over 70 years, and France is the most thriving and well-to-do nation in Europe. America under Protection has advanced almost beyond conception. In 10 years she has been able to supply all her wants in iron and steel, and could in addition supply these essentials so as to meet the requirements of the whole world. France and America see plainly the Cobdenite fallacy, improperly called Free Trade. The Cobdenites have for nearly 40 years been looking for foreigners to do as England has done—that is, to keep open house for the rest of the world, and to permit foreigners to destroy home capital, and pauperise or exile home workmen.

Confidently the Cobdenite prophets affirmed that in five years all the world would be Free Traders. Thirty years have passed, but foreigners have more sense than to imitate our disastrous folly. They complacently dip their hands into John Bull's pocket and take what they please, whilst poor John labours under Bright and Cobden on the brain.

Your correspondent, "P. D.," seems to be wakening to fact that the bubble, miscalled Free Trade, has carried us into a fog. It has indeed, and the various trades of our nation labour and groan under its dire inflictions. Where have we been travelling to, asks "P. D."? Why along the road of pauperism and bankruptcy. It is time indeed that people should wake up and get to know that all wisdom does not centre in the Cobdenites and their mightiest of all shams, one-sided Free Trade.

A few capitalists in Chili and Australia are flooding England with copper, whilst the Dutch slave raised tin, and the tin shovelled up by Chinamen in Australia is sent to England duty free to ruin the Cornish mineowners, and to starve or exile a once happy and industrious people. The book worms of political economy will tell us no doubt that the county of Cornwall is sacrificed in order that the other counties may get lead, copper, and tin at the lowest possible figures. The minority must be crushed in order that the huge majority may reap an almost imperceptible benefit. If John Smith has 10 sons is he justified in starving one in order that the other nine may each get a little more? Such a course is morally wrong, and cannot therefore be politically right. No Government should permit any class to be oppressed or stamped out for the benefit of the rest, or for that of foreign nations.

"P. D." need never look for real Free Trade. No foreign nation will ever entertain the suicidal mania which has possessed England for so many years.

Commodities which England cannot produce should be imported duty free, but home industries should be reasonably protected. No man of sense would ask for prohibition, or seek to return to the old system of unfair Protection. "Fair Trade" should be the guide in this matter. The very name, however, of just Protection or Fair Trade raises a perfect howl of contempt or execration from the editors of the London dailies, and indeed from most journalists who concern not themselves with aught but the parrot cry of "Free Trade," for which they can render no reason.

There was a time when 20,000 Cornishmen rose to defend one of their fellow-Cornishmen, and spoke out loudly. They must have fallen away from their former daring energy or they would not sit still and see their county blighted by the baneful effects of "Free Trade" and yet make no sign. Let them agitate for fair Protection "one and all."

Were Richard Cobden alive now he would be foremost as a "Fair Trader." He would long since have seen that duty free food and duty free importations, which ruin or cripple home industries, are under essentially different conditions—the one is often a blessing, the latter is, and has been, an unmitigated curse. I have only illustrated the effects of Free Trade on the lead, copper and tin industries, but the same bane and canker is eating into all other home industries; not indeed into the liquor traffic, but that is not an industry at all, but an inexorable destroyer, worse, says Mr. Gladstone, than war, pestilence, and famine combined. All honour to Cornishmen who are trying to stop its ravages, at all events on the Sabbath-day.

RECIPROCITY.

MINING IN THE TAVISTOCK AND BEER DISTRICT.

SIR,—In the *Mining Journal* of Nov. 24 I was pleased to observe the remarks of your Cornish Correspondent in reference to this district, having been so long connected with several of the mines, and always advocated deeper sinking, which I firmly believe will be found remunerative. Now, although the new railway will be of great assistance in opening the Beer district, still the mines there have always had the advantage of water carriage for their imports and exports, owing to the navigable River Tamar. It must be borne in mind that in the Beer district, although lead may be found at a very shallow depth, still the only profitable mines were those worked below the 100 fm. level. For instance, South Hooe, which returned large dividends between the 100 and 260 fm. levels, and only then ceased working through the ore ground dipping away from the shaft and the expense of driving through the unproductive part of the lode being so great to reach it at each succeeding level, but not from poverty, the lode being as rich as ever at the lowest level. Altogether over 1,000,000*l.* sterling was taken out of this mine. Also South Tamar, which was 160 fms. deep, and had paid dividends to the amount of 30,000*l.*, when the river broke into the shallow levels in the year 1866, and the mine was drowned.

There is one point which must not be lost sight of in reference to lead mines in this district and that is the large quantity of silver

contained in the ore, varying from 50 to 60 ozs. to the ton; and, although the market price of lead is low, this large quantity of silver per ton will still enable the mines to obtain a good price for their ores. There are several well known good setts deserving of a spirited development, having all the preliminary work already done, and only waiting for those who have courage and confidence to rework them. And it can be proved that success is almost certain to be achieved for a small further outlay. Also other lodes that have only been slightly explored, although showing indications of becoming very productive when depth is attained. It is a pity that some of the thousands expended abroad in working mines (too far away for those who invest in them ever to see how their money is spent) cannot be kept at home to develope these genuine properties, and it these few lines calling attention to this celebrated although nearly forgotten district should result in some of them being reworked, my object in writing to you will have been gained.

The price of lead appears likely to improve, therefore now is the time for intending investors to seek out *bona fide* mines and bring them into working order, that they may be ready to take advantage of the rise when it comes. EDWARD BETTELEY.

Leeds, Dec. 6.

MANAGEMENT OF MINES.

SIR,—I can with certainty endorse every word your correspondent, Mr. Vivian, states. It may not, however, be well known that through pure force of circumstance many managers of mines hold their positions. Men who have simply followed farming have by some lucky hit found out that probably ore lay beneath the property they rented, and have taken upon themselves to open up the ground. Some scientist has usually landed in a particular district, and having examined the rocks, soil, springs, &c., in the district, concludes that ore should be found at a certain place. Probably with success they bore, and find the precious metal. Then notice the swarm of small ignoramuses who crowd around with jealous eyes, longing to put their fork into a piece of land adjoining the successful boring property. I am convinced that there is too much of this haphazard manner of working mines. As Mr. Vivian states, many are simply pitchforked into a responsible position, and they go on muddling the mine into a perfect chaos.

I state that no man who is not a first-class petrographer, and understands thoroughly the associating minerals, in other words, who is not a good geologist and mineralogist, has no moral right to undertake the opening up of any mines. I have seen the greatest absurdities perpetrated in opening up mines. Driving levels blindly for hundreds of feet, rising, or sinking, where there was not the slightest chance of success, and so on, trusting to luck, or, to how long the shareholders' money would enable them to continue experimenting as moles. Any gentleman who knows his work, and has the opportunity of getting into many mines will very soon see how the moles have been burrowing to no purpose. There is also a great amount of false economy in the working of many mines. The miners, as a rule, put in their bore-holes for blasting where probably it is most convenient for the strike (double hand or single, it is just the same) without any regard to the stratigraphy of the rock, line of least resistance, or anything else, but just blindly. The miner puts in a charge of dynamite, and shatters the rock no doubt, but he does not calculate that for a certain amount of explosive he should bring down a proportionate tonnage of rock. The miner probably pays directly for the dynamite he uses, bores two holes and uses much dynamite, where one hole economically placed and half the dynamite would effect the same work. This shows how the miner occupies his time uselessly, thereby taking money not only out of his own pocket, but also out of the owners. Then, again, look at the state of the drifts and trams in some mines. All higgledy-piddledy, great holes in the level floors, lines crooked, sleepers, if any, rotten, a foot deep in water, and the man running the ore jogging about from one side to another, unrailing frequently his bogey, wasting time, blocking the way, and getting to the shaft-foot by some means and also in a great amount of time. The remedy is a good road kept well in repair, good drainage, best form of bogey, with wheels economically adjusted and best rail.

We very frequently find that the winning is left entirely in the hands of an old hand, who knows all about mining, and who considers himself competent to surmount all difficulties. This is the kind of man who would not listen to better advice, and who would say - that he knew his own work best. This is the man who calls every crystallised rock he meets with spar, but ask him what kind? is it quartz, calc, fluor, &c.? he does not know, and moreover does not care. This the foolish way the money of shareholders is squandered, and I am convinced that what I state must come home very forcibly to many holding positions they are little fit to hold, who have mistaken their profession, and could handle a plough to advantage. No wonder mines do not pay when double labour is used and paid for, and large salaries given to those who open a few letters each morning, check the office-boys' day book—rest of time, the newspaper. This is certainly not the way to make mines pay.

Ulverston, Dec. 3. WARREN ANDERSON.

SILVER-LEAD AND BLENDE MINING.

SIR,—Although the price of lead ore is low still it is satisfactory to find there is a tendency of improved prices, and numerous home mines which are now languishing, owing to the apathy of shareholders and investors, will soon command higher rates, and when once a demand sets in we may very soon see 14*l.* to 15*l.* per ton for our lead ores, but at present we must look to those mines producing silver-lead and blende, as to a great extent they are independent of the lead market, and I would point out that the silurian formation produces the largest amount of silver per ton; we may take as an instance Merionethshire, where some of the silver ore assays 29 ozs. of gold and 300 ozs. of silver per ton, copper 20 ozs., and blende 400 ozs. per ton, and the lodes can be easily worked, are very numerous, and with a moderate amount of capital expended in opening them out those interested will be handsomely remunerated. In conclusion, I cannot too strongly urge investors and capitalists to visit this country and secure mineral grants before the inevitable great rise takes place, and not expend their money abroad, but support legitimate home mining which will bring a lasting benefit, and where for a small expense they may see for themselves the great riches of this country.

Greenfields, Dec. 6. JOHN L. M. FRASER, C.M.E.

BICKTON SILVER AND LEAD MINE.

SIR,—I have known the estates on which this mine is situated for the last 30 years or more, and on Thursday paid a visit to the mine, which I will say at the outset I was much pleased with the mine itself, that is the engine-shaft and floors, and water-wheels and other varieties of things usually found in Cornish mines. It is situated in a beautifully wooded dale in an opening sufficiently wide for extensive floors for dressing, and a fine stream of water running through it for any purpose it might be required for. The sett is situate on the eastern slope of the Caradon Hills, and is bounded for some distance by the River Lynher, on the other or eastern side of the River Lynher the slopes of the Kit Hills begin a gentle rise, so that Bickton Mine is about midway between the two great mining districts of Caradon and Kit Hill. The sett of Bickton Mine is very extensive, and in a magnificent strata of ground, indeed being a true clay-slate throughout, and very soft and easy to work, as has been proved in the bottom levels some 60 fathoms deep. There are six lodes discovered in the sett at present, four of silver-lead and two copper ones, the first or No. 1 being a silver-lead one, and on which the engine-shaft is sunk to the depth of 60 fathoms perpendicular, from which some superb work has been got in the driving north; it is about here that the lode is 9 ft. in width and is composed of silver-lead ores, chloride of lime, can and mundic, and felspar, and altogether highly mineralised.

The first thing I may say that I saw on Thursday was the two captains of the mine just then come up from underground washing some pretty prills of galena, that they themselves had just broken in the 60 fm. level, they were also hauling good work with the horse-whim at the same time or from the lode in this level, and they informed me that the lead-bearing part of the lode is about 3 ft. underlying east. No. 2 lode is about 50 fms. to the west of No. 1, but not much has been done, only just to show it to be a well-defined one running parallel with No. 1, and underlying east. No. 3 is also a silver-lead lode running parallel with the other. No. 6 is also silver-lead, now just discovered, and is considered to be a lode of the highest character for silver-lead, and runs parallel with the others and some distance to the east of No. 1, and underlying west, and will ultimately come into that lode and make a grand junction indeed, for when two such magnificent lodes meet it cannot be otherwise. This lode as far as can now be seen is composed of horn-spar, flookan, and strong spots of lead, and about 4 ft. 6 in. to 5 ft. wide. No. 4 is a copper lode, but not much has been done on it as yet, but it is a very strong lode indeed. No. 5 is also a copper lode of splendid proportions, 5 ft. wide, and runs direct east and west through all the other lodes, and is composed of large quantities of ruby, blende, and mundic, with beautiful spots of copper, and is highly mineralised throughout, and I have no doubt at all but this is one of the South Caradon lodes, where such good dividends have been realised. By the courtesy of the agents I was taken over the floors, and saw some splendid specimens of lead, some the captain told me would weigh or dress from 30 to 40 lbs. of lead in each. I was shown some other points, and was much pleased with all, everything working nicely and in good order throughout. G. S.

North Caradon, Dec. 4.

PERRANZABULOE MINES.

SIR,—Comparatively speaking very little work has been done on the tin lodes of this district, but sufficient to warrant further trial, and the belief that in depth they may prove as rich as the St. Agnes or Western Mines. The most important tin mines so far discovered are the Budnick, Wheal Vlow, Droskin, and Raymouth, all of which have only been worked to shallow depths, and the lodes beaten away to the bottom levels. The burrows (refuse heaps) on the two former mines have been worked by parties of miners since the stoppage of underground operations, up to the present with successful results. This is a good proof of the productiveness of the lodes. Portions of the burrows of Budnick are now being carted a distance of nearly two miles to the Perran Coombe stamps, and I learn from the men engaged in this occupation that they are receiving a good profit, beyond being paid well for their labour. It is a mystery to me how tin miners have not sought this district as a field of enterprise, as it certainly shows the best indications of being productive in large quantities of that mineral.

The whole of the cliffs on the southern side of Perran Bay are highly mineralised. An old miner yearly makes a good thing out of dressing the sand for tin that he scrapes up underneath the cliffs at low water. The formation of the cliffs is clay-slate, full of small veins of good quality tin, hence the cause of the sand containing it as it is washed by abrasion from the cliffs. This is the only solution of the tin being in the sand, as there are no adits or levels near from whence it might possibly come. The idea has been entertained by many people that if the whole of the cliffs were worked for tin a fair margin of profit would be left. Some years ago this idea was put in practical form by a Mr. Phillips, a native of Perranporth, who erected the stamps referred to for that purpose; but after stamping the stuff from the cliffs for some time he found that it would barely pay the cost of doing so, and consequently abandoned it. It is, however, thought feasible by many that by the cheaper and more expeditious mode of dressing tin by continuous jigging in place of the old system that the cliffs would pay for working over.

It is, indeed, a great pity that continuous jigging has not had a fair trial in the county in connection with tin. It was thought that after the reading of Capt. Argall's valuable paper on the subject, and the kind offer he made of his free services, to erect the machinery on any of the mines that would try it, that the Mining Institute would see the importance of the matter, and arrange to try it fairly under their auspices, instead of which it has met with the adverse criticism of many of the members. Capt. Teague generally strikes the keynote of the Institute, and in this instance he and his young son have condemned the system for tin, and as a natural sequence the Council and the tail end of the Institute have done likewise. In common justice to Capt. Argall, would it not have been the proper thing to have tested the principle before doing so? Such conduct is like hanging a man without a trial. Unfortunately for those who have had dealings with the Institute they have no Habeas Corpus Act to appeal to, otherwise Messrs. Dingey and Son's letter in the *Mining Journal* of Oct. 29 would have provoked an explanation or an apology. Not that the condemnation of the Institute will injure the popularity of the system other than in the county, as it has been adopted at tin mines abroad. There is this much to be said in its favour with regard to its effectiveness in dressing Cornish tin that at the only mine it has been fairly tested in the county—Wheal Jane—it has proved a success. It is the opinion of Capt. Southey, a gentleman who has had sufficient experience to give one, that the system will answer for tin, and, moreover, effect an immense saving in the cost of dressing, which fact in face of the ordeal mining is now passing through is a matter even worthy of the attention of that august and dogmatical body—the Mining Institute of Cornwall.

Several of the most important mining setts in this district have been taken up by niggardly farmers, who would just as soon lose a tooth or finger-nail as spend a penny in mining or anything else unless they could see a fair prospect of making cent. per cent. for their money, and so long as they pay the minimum rent the lords allow them to hold the setts. This dog-and-manger system of holding setts is an injustice to those who would really take them up with a view to their development, and the sooner it is knocked on the head the better it will be for the district. W. NINESS.

Perranporth, Dec. 4.

NEW GOLD SAVING APPARATUS.—The attention of miners and all others who are interested in gold mining pursuits has recently been directed to Messrs. Twining and Birchall's invention (or rather discovery) of a new and improved method of saving gold. The gentlemen referred to are at present in Westport, making experiments with models of the proposed apparatus, and we, as well as many of our townspeople, have had the pleasure of seeing them at work. On Sept. 6 a bag of beach tailings that had already been treated in the ordinary manner—*i.e.*, over the copper plates, was put through the machine in presence of the miners who brought it in, and they were unable to find a single speck of gold in the residue. It should be stated also that the gold obtained, though plentiful in quantity, was of a rusty character, and could not be separated from the debris in the ordinary manner. The principle of the discovery might be applied in very many different ways, as circumstances or material to be operated upon required, but broadly stated it is this: If water is introduced with a certain pressure in hydraulic head under a perforated plate on which a certain thickness of quicksilver is deposited the quicksilver remains on the perforated plate, and is broken up into very small globules in violent commotion. The sand or other gold-carrying material to be treated is brought into more intimate contact with the quicksilver than by any other process, being forced up through the plate and through the quicksilver. This seems a very simple matter, but, simple as it seems, it does not appear to have been tried before. The Clunes ripple forces the material against the quicksilver; this invention forces it through the quicksilver. A machine may be made to contain any number of beds of quicksilver, although two have been found sufficient for all practical purposes. The invention has been patented and will shortly be tried on a large scale. It is the opinion of many mining experts that this process will ere long supersede all others for saving fine gold. It appears to be particularly applicable to our beach workings, and, should it turn out as well when working on a large scale as in sample tests, will be of great advantage to the district and to miners everywhere.

— Buller (Australia) Miner.

Mr. R. H. M. Jackson, of Sidcup, has published, through J. Nisbet and Co., "The Most Wonderful Story of His Conversion," and the work may be obtained in Sidcup at the post-office, and in Walbrook of Mr. Kember, stationer.

GALVANISED IRON AND TIN-PLATES.—Messrs. BROOKER, DORE and Co. (Dec. 3) write:—In galvanised iron the demand is well sustained and prices remain unchanged. For tin-plates, although there is still a large demand, prices have been a shade easier, 15*s.* 10½*d.* to 16*s.*—Liverpool is, however, the lowest price that has been accepted for B.V. grade I.C. coke.

HOLLOWAY'S OINTMENT AND PILLS—COUGHS, INFLUENZA.—The soothing properties of these medicaments render them well worthy of trial in all diseases of the lungs. In common colds and influenza the pills taken internally and the ointment rubbed externally are exceedingly efficacious. When influenza is epidemic this treatment is easiest, safest, and surest. Holloway's pills and ointment purify the blood, remove all obstructions to its free circulation through the lungs, relieve the overgorged air-tubes, and render respiration free without reducing the strength, irritating the nerves, or depressing the spirits. Such are the ready means of saving suffering when afflicted with colds, coughs, bronchitis, and other complaints by which so many are seriously and permanently afflicted in most countries.

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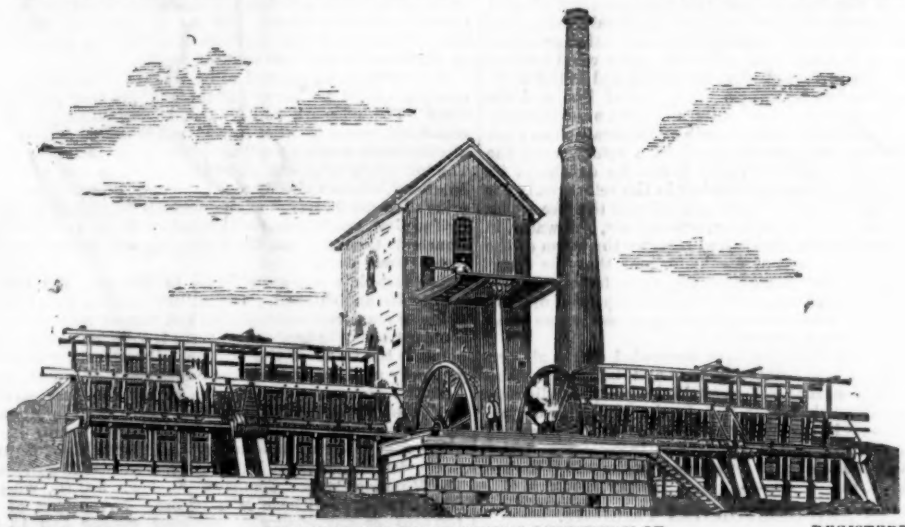

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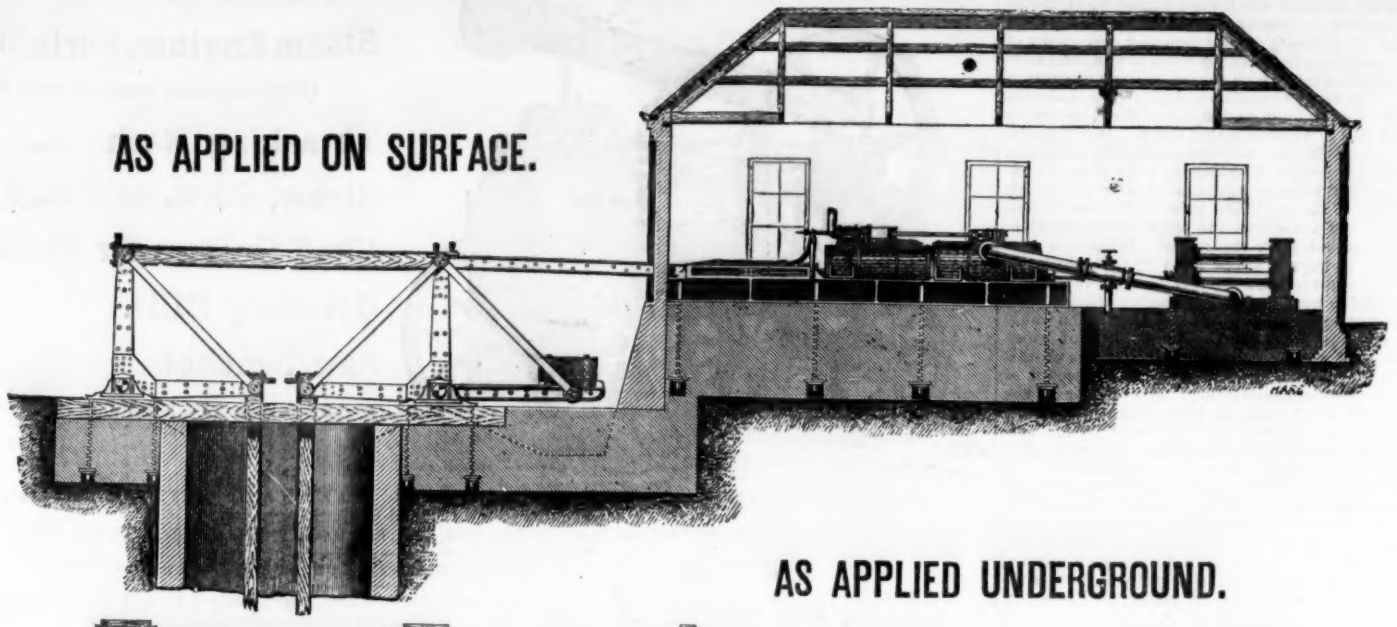
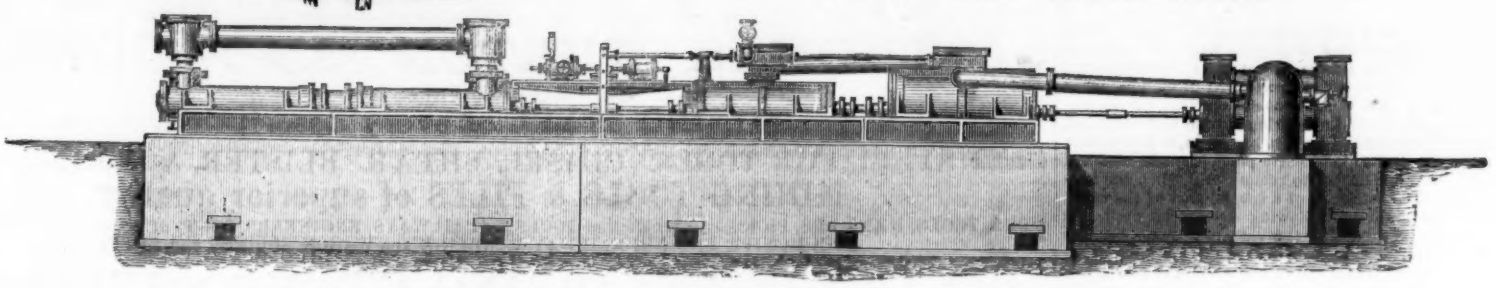


AS APPLIED UNDERGROUND.



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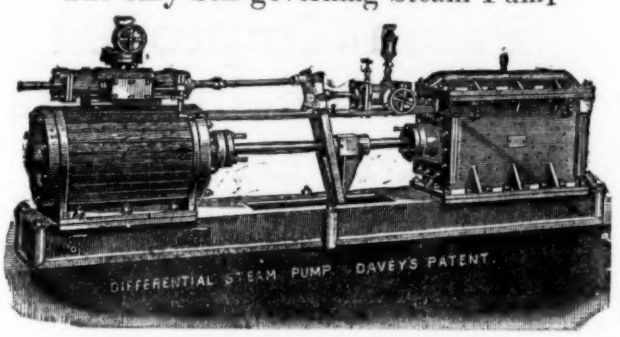

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PRICE LIST.

Diameter of Steam Cylinder. Inches.	Diameter of Water Cylinder. Inches.	Length of stroke. Inches.	Gallons per Hour.	Height to which water can be raised with 40 lbs. steam pressure. Feet.	PRICE. £	Price with Condenser, in Suction Pipe. £	Price with Air Pump Condenser. £	Diameter of Suction and Delivery Pipes. Inches.	Diameter of Steam Pipe. Inches.	Diameter of Exhaust Pipe. Inches.
10	5	15	5,200	250	65	72	85	5 3/4	1 1/4	2 1/2
10	7	15	10,400	130	70	80	100	6	1 1/2	2 1/2
10	9	15	17,300	70	85	100	120	6	1 1/2	2 1/2
12	6	24	6,500	250	90	104	130	4 1/2	1 1/2	2 1/2
12	7	24	10,500	180	96	110	136	5 1/2	2	2 1/2
12	8	24	13,500	140	100	114	142	6	2	2 1/2
12	10	24	21,300	90	120	136	175	7	2	2 1/2
14	7	24	10,400	250	110	130	156	5 1/2	2	2 1/2
14	8	24	13,500	190	120	145	165	6	2 1/2	3
14	9	24	17,300	150	130	150	172	6 1/2	2 1/2	3
14	10	24	21,300	120	140	162	190	7 1/2	2 1/2	3
14	12	24	30,800	80	160	190	216	9	2 1/2	3
16	8	24	13,700	250	140	170	195	6	3	3 1/2
16	9	24	17,300	200	150	180	215	6 1/2	3	3 1/2
16	10	24	21,300	160	160	196	225	7 1/2	3	3 1/2
16	12	24	30,800	110	180	220	246	9	3	3 1/2
16	14	24	42,000	80	200	242	264	10 1/2	3	3 1/2

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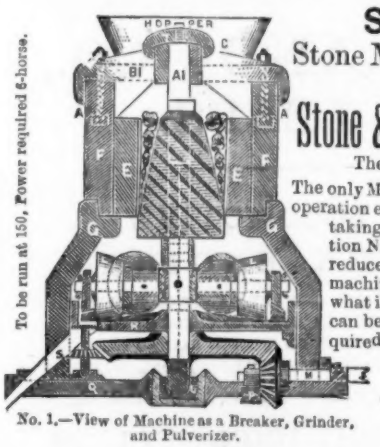
The Simplest and Strongest Machine in the World.

To be run at 150, Power required 6-horse.



No. 1.—View of Machine as a Breaker, Grinder, and Pulverizer.

The only Machine made that will Break, Grind, and Pulverize in one operation either wet or dry mineral to any degree of fineness, also by taking away the rollers it will break to any size (see illustration No. 2.) This is the only machine in the world that will reduce all that is put into it to the required size, other machines open and shut, so let larger sizes through than what is wanted, besides mixing them together. A Machine can be seen at the Works in motion, breaking up any required mineral.

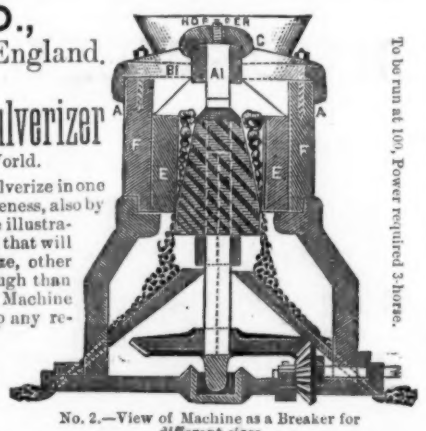
READ THIS—

Lord Donnington's Works, Cloud Hill,
Near Ashby-de-la-Zouch, Nov. 29, 1883.

Gentlemen,—The Breaker, Grinder, and Pulveriser is working well, and giving satisfaction.

Yours truly,
J. W. STABLEFORD, Manager.

To be run at 100, Power required 3-horse.



No. 2.—View of Machine as a Breaker for different sizes.

AND THIS—

To Messrs. S. Mason and Co., July 19th, 1881.

Dear Sirs,—The six Stone Breaking Machines you have supplied to us are doing their work well and giving every satisfaction. Our stone being so hard, we have broken several Machines that we had bought from other firms, but the Machines purchased from you are strong enough to meet our requirements.

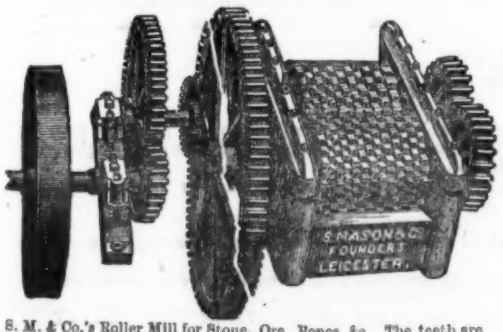
Yours truly, S. D. POCHIN, Croft Quarries, near Hinckley.

AND THIS—

The Tees Scoriæ Company, Acklam Furnaces,
Middlesborough, Nov. 29, 1883.

Gentlemen,—The 12 × 7 Stone Breaker you supplied us with in August, 1882, is working first class. We should think it has the most severe test (continually) to which any Stone Breaker is subjected to. We are pleased to inform you that our customers, who are chiefly Surveyors, speak highly of it.—Yours truly, T. W. PENT, Secretary.

Messrs. S. Mason and Co.



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BAROMETRICAL VARIATIONS, AND EXPLOSIONS OF FIRE-DAMP.

In an interesting paper on the Influence of Atmospheric Depressions on Fire-damp in Coal Mines by Mr. Emile Harzé, referred to in Mr. James Forrest's Inst. C. E. Abstracts of Foreign Papers, it is remarked that the influence of variations of barometric pressure on outbursts of fire-damp in coal mines is a question about which mining engineers are not yet agreed; but the balance of authoritative opinion is strongly in favour of those who regard these variations as capable of bringing about disasters which often cannot be otherwise accounted for. Government Inspectors have been directed to urge upon colliery managers the necessity of watching the movements of the barometric column, and laws have been enacted to compel observance of the recommendations made with regard to these changes of atmospheric pressure. Yet many engineers of high repute maintain that no appreciable effect, or at most no dangerous effect, can result from a sudden and great fall in well-ventilated mines. It is objected that the volume of air passed through the ways per minute is so great that the light carburetted hydrogen invading the ways from the expansion of accumulations in the broken mine cannot enter fast enough to vitiate the current up to the explosive point; and calculations founded upon Marriotte's law are adduced in proof of this assertion. This view errs, however, in being too theoretical. It assumes that all the gas invading the airways is swept away by the ventilative current. Leaving out of consideration the fact that the ventilative current in some parts of the workings may be highly charged with gas given off from the working faces, and that a small addition would be sufficient to raise it to the firing point—like the drop of water that causes the already full vessel to overflow—the holders of this view may be shown to be in error by omitting to take account of some of the essential elements of the question. The velocity of the air current is not the same at all points in the section of the ways. As a matter of fact, the sides and roof are not swept by the current, for they not only present great irregularities of surface, but offer a succession of recesses or panels formed by the timbering. In these spaces between two sets of timbers the air has little or no progressive motion. The gas, arrested by these projections, accumulates between the caps or head pieces on the roof. In this way long trains of inflammable gas may be laid to any considerable accumulation that may exist—a condition of things that is obviously dangerous. Moreover, since the gas can escape but slowly from these situations, the danger may subsist even after the barometer has begun to rise again.

The author concludes from a consideration of these facts—first, that a sudden fall of the barometer may bring about a dangerous state of things in fiery workings; second, that the calculations put forward by some engineers who reject the possibility of such influence are formed from a point of view which does not embrace all the elements of the problem; and, third, that during a rapid and deep fall, and until some time after the succeeding rise has set in, it is desirable to quicken the ventilation and to take extra precautions in blasting. This third conclusion leads the author to remark that when the ventilation, whether of a whole district or of a special part of the workings, is increased for the purpose of allowing shots to be fired, it is prudent to delay firing for a time after the change is made, because an increased velocity of the air current may draw out gas from existing accumulations, and carry it into the places where the blasting is to be done. The same effects in a less degree may be caused by the opening and shutting of doors, or the removal of any obstruction to the air current. Mr. Cornet has directed attention to the fact that the high winds, which often accompany a deep fall of the barometer, appreciably diminish the action of ventilative apparatus.

HEAT ENCOUNTERED IN TUNNELLING THROUGH HIGH MOUNTAINS.

An admirable abstract, in English, of Mr. E. Stockalper's memoir—Les Grands Tunnels Alpins et la Chaleur Souterraine—recently published at Lausanne, Switzerland, is given in Mr. James Forrest's Abstracts of Papers in Foreign Transactions and Periodicals (London: Institution of Civil Engineers, Great George-street), just issued. Believing it is this question of the heat to be encountered which must really decide the choice between the competing projects for long tunnels through Mont Blanc and the Simplon, the author summarises the knowledge that has now been acquired, and applies it to a comparison of the two proposals. At the outset he pays a high tribute to the value of the information contributed and the investigations conducted by Dr. Stapff, the engineering geologist of the St. Gothard Railway. After reviewing the effects of a high temperature upon the workmen and upon the progress and cost of the work, he alludes to the limit at which a tunnel would become too hot to work in, estimates the temperatures likely to be met with in the Simplon and Mont Blanc tunnels at various points along their length, and considers the best means of ventilating and cooling them during construction.

The method which he himself recommends for tunnelling through the Simplon or other high mountains is to extend the drivage from each entrance to as great a distance into the mountain as can be done without the heat becoming so excessive as to interfere too seriously with the work, and then to sink from the surface an inclined upcast air shaft, underlying forwards to join the tunnel at the furthest point reached, whereby efficient ventilation would so far be obtained. From the junction the work would be pushed forwards by driving simultaneously both a bottom heading and a top heading, the latter alone being in communication with the shaft. The two headings would be kept continuously ventilated pretty close up to the end or forebreast by holing successive rises or communications between them, so that the current of fresh air entering from the tunnel mouth should flow forwards along the whole length of the bottom heading, pass up through the furthest rise, travel back along the top heading, and be drawn up the inclined shaft by an exhausting ventilator at top. The enlargement of the tunnel to its full final section would be completed from the entrance to the junction with the shaft; beyond the shaft it would not be continued until after the headings had met from the opposite sides of the mountain. But meanwhile the top heading would be enlarged to the full arch of the tunnel roof, which would also be lined with masonry, leaving only the enlargement of the bottom heading and the building of the side walls to be completed afterwards. The size of the upcast shaft should be not less than 13 ft. by 10 ft., and its inclination is sketched at about 45°, so as to render it serviceable also in directing the headings along the true line of the tunnel for ensuring their meeting correctly.

Owing to the heat in the St. Gothard Tunnel the conditions under which the work was there carried on reached nearly the limit of feasibility. From the time of the headings meeting to the completion of the tunnel the cooling produced by the ventilation did not exceed ½° C. or 1° F.; and the tendency of the air to get saturated with moisture continued almost the same on the completion of the work as during its progress. On the other hand, the places where the work was being done by compressed air were thereby cooled down fully 2° C. or 4° F. below the temperature of the rock; and after the headings had met the through current of ventilation, averaging 750 cubic metres, or 26,000 cubic feet per minute, materially facilitated the work. By the method which he recommends the author considers a tunnel can be successfully driven through rock hotter by 5° or 6° C.=9° or 10° F. than was met with in the St. Gothard Tunnel. In the Simplon Tunnel the maximum temperature would not exceed about 36° C.=97° F.; in this respect, therefore, the conditions would be analogous to those already dealt with in the St. Gothard Tunnel; but in the proposed Mont Blanc Tunnel the temperature would rise as high as about 53° C.=127° F., rendering the feasibility of the work very questionable.

CHRISTIAN MILLION.—The special Christmas number of this periodical contains, in addition to the usual matter, some carefully written and readable tales, and is illustrated with a well-executed coloured plate from the original oil painting by Mr. A. F. Patten, S.B.A.—"Twinkle, Twinkle, Little Star." The engraving, a Christmas party, drawn by Harrison Weir, is also very good.

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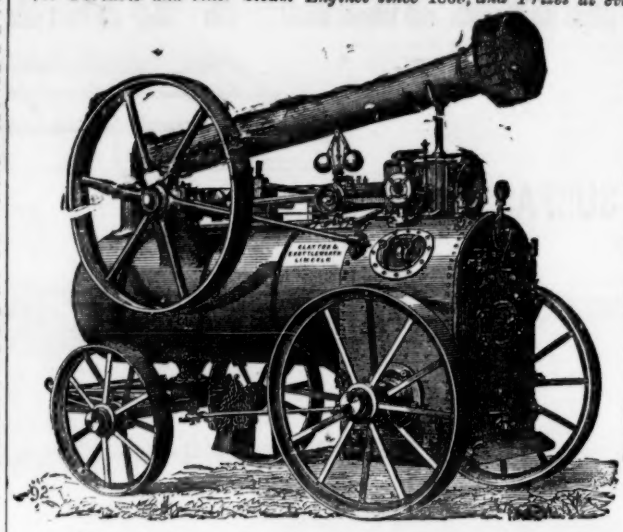

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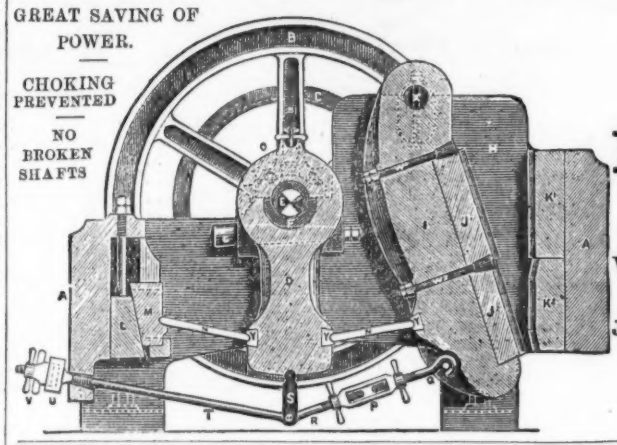

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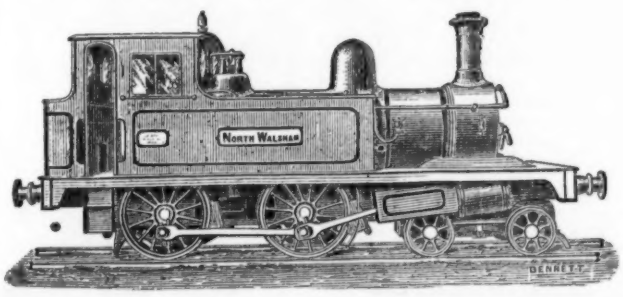

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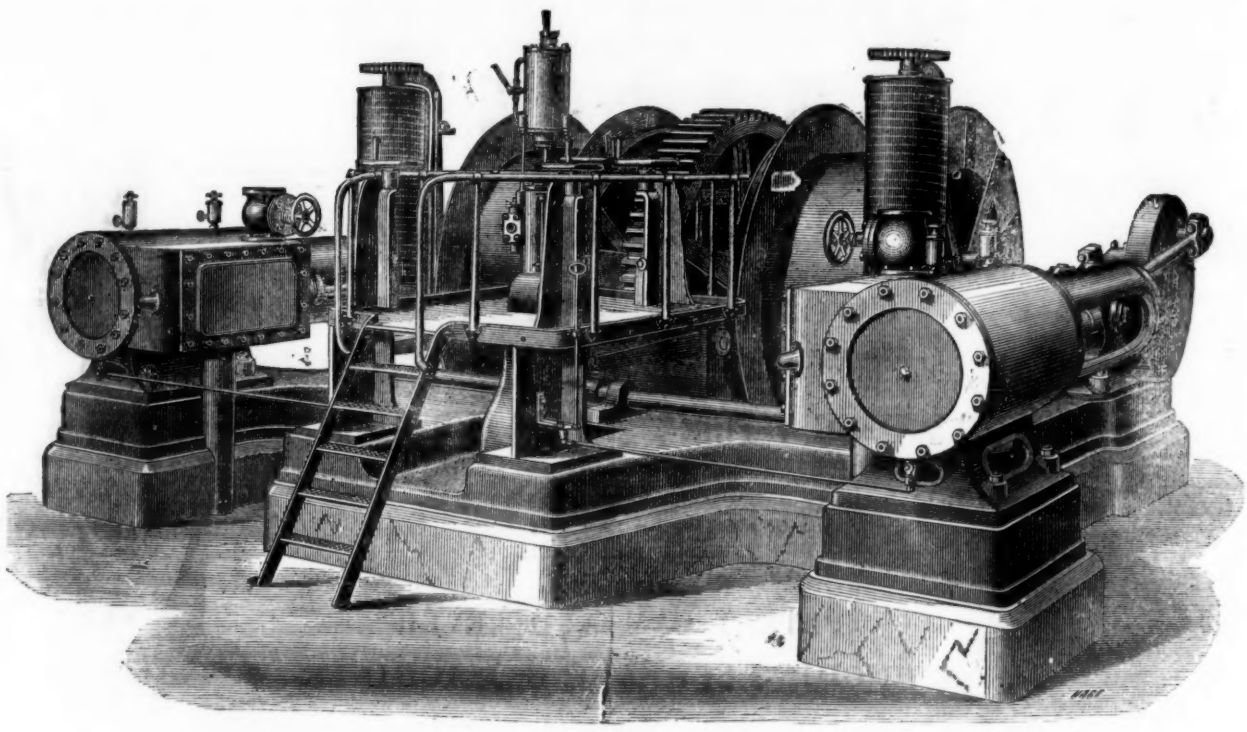

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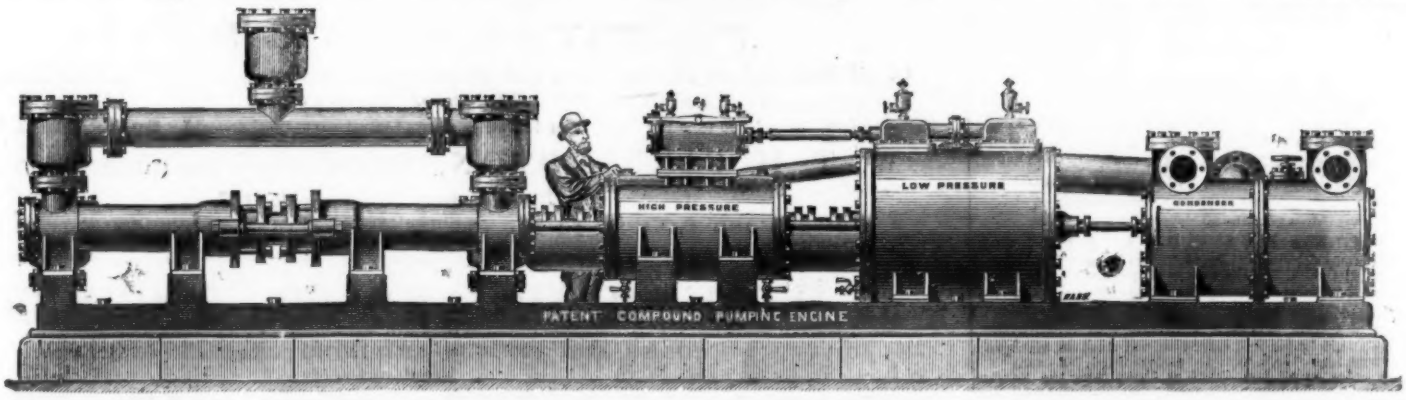

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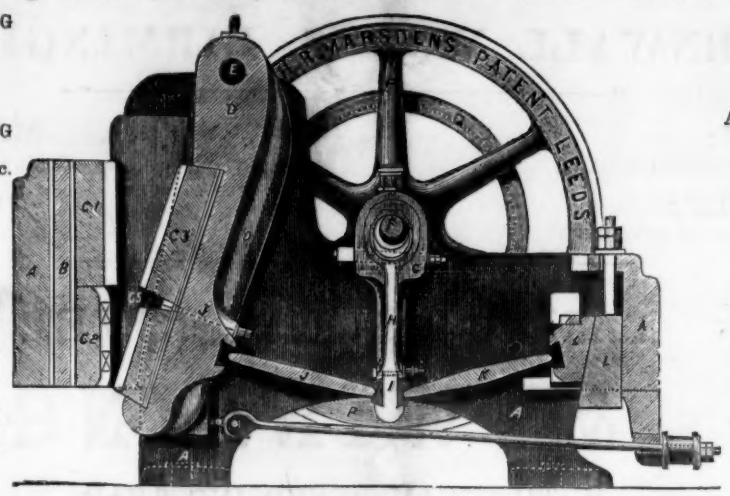

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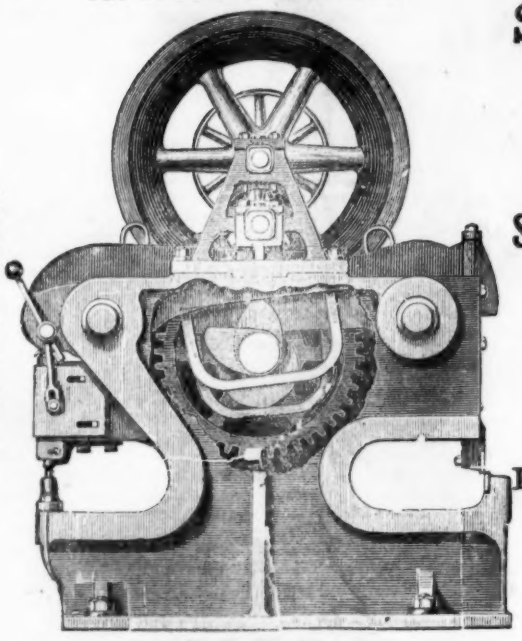

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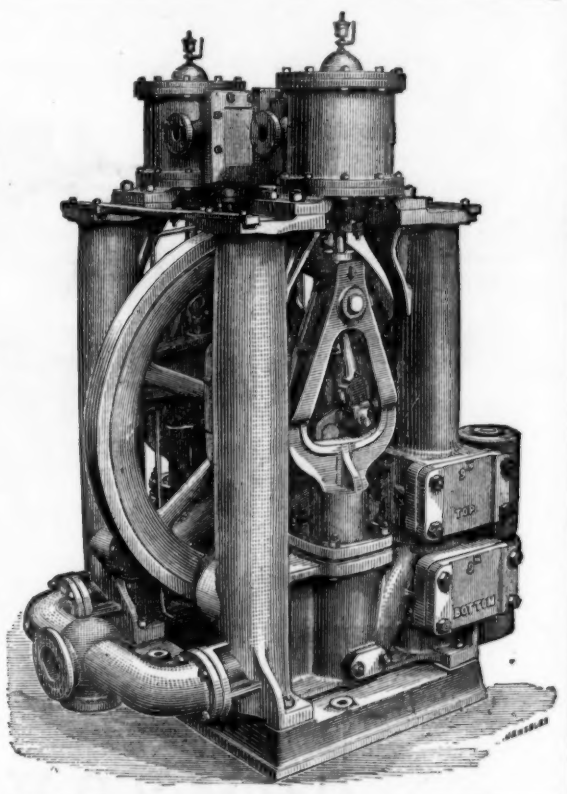

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